

MESSAGE FROM THE CO-CHAIRS OF THE WATER CONVENTION 2022 PROGRAMME COMMITTEE



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Singapore International Water Week 2022 returns as an in-person event from 17 to 21 April 2022 at the Sands Expo & Convention Centre in Singapore.

On behalf of the Programme Committee, we warmly welcome you to the Water Convention, one of the main flagship programmes of SIWW2022.

In response to the Call for Papers, we received over 350 high quality papers from 42 countries in the short span of 12 weeks. We are grateful by the strong show of support from the international water community to the Call, despite the uncertainties and challenges posed by the on-going pandemic. Many papers of exceptional quality were received and after a careful review of all the papers, the Programme Committee has put together a quality Water Convention programme, which we believe is the very best yet.

To ensure the knowledge presented at the Water Convention keep abreast with the latest challenges and trends facing the urban water profession, we have included a new theme on Nexus and Circularity in this year's Water Convention, alongside other traditional themes in water distribution, water treatment, wastewater management, water quality and health, and cities of the future. We hope this theme will add a new dimension to the discussions, as the water sector places increasing emphasis on circular resource management and sustainability.

Besides the technical oral and poster sessions, delegates to the Water Convention can look forward to the popular Hot Issues Workshops, where we hope to stimulate open discussion on hot issues, such as digital transformation of the water sector, future of seawater desalination, sustainable wastewater management, coastal revitalisation, consumer aspects in reuse and recycling of domestic water and carbon circularity.

As the Water Convention enters its 9th edition, we remain confident that it continues to serve as one of the leading platforms for the open sharing of technology, innovation, and best practices in urban water management. We wish to thank the continued support of the International Water Association as the co-organiser, as well as the many water experts who have contributed their time as Programme Committee members, abstract reviewers, session co-chairs and invited speakers.

We look forward to seeing you in Singapore as a delegate. For those who are unable to join us in Singapore, all sessions will be available for on-demand viewing via SIWW+, SIWW's newest online digital content hub.

Together, let us work towards our shared goal of building a better water future for all.

SINGAPORE INTERNATIONAL WATER WEEK

The Singapore International Water Week (SIWW) is a global premier platform to share and co-create innovative water solutions. The biennial event gathers stakeholders from the global water industry to share best practices, showcase the latest technologies and tap business opportunities. SIWW is part of the strategic programme of the Singapore Government to grow the water industry and develop water technologies.

In 2018, the SIWW celebrated 10 years of water excellence and ended on a high note with more than 24,000 participants from across the world and S\$23 billion in total value for announcements on projects awarded, tenders, investments and MOUs, underscoring its role in driving industry growth. The 8th edition of the Singapore International Water Week (SIWW) was held alongside the World Cities Summit (WCS) and CleanEnviro Summit Singapore (CESG).

Singapore International Water Week (SIWW) 2022 returns as a physical event from 17 to 21 April at the Sands Expo & Convention Centre, Marina Bay Sands, Singapore.

As one of the leading international water events in Asia, SIWW brings thought leaders, experts and practitioners from governments, utilities, academia and industry together to share and co-create innovative solutions to meet with pressing urban water challenges globally.

Organised by PUB, Singapore's national water agency, SIWW will cover all aspects of the urban water cycle reflective of current trends and issues in and around the water sector. Critical to shaping the future of water, emerging themes such as digital water, resource recovery and climate resilience will continue to be featured at SIWW.

Programme at a Glance

DATE	AM		PM		EVENING	
17 April (Sun)	Technical Site Visits					Jurong Island Desalination Plant Opening <i>(by-invitation)</i>
	SWA Golf @SIWW					
	TechXchange					
	Hot Issues Workshops					
18 April (Mon)	Joint Opening	Expo Visit	Environment & Water Leaders Forum	Lee Kuan Yew Water Prize Lecture	WC Poster Presentation	Lee Kuan Yew Water Prize Award Ceremony & Banquet @ Ritz-Carlton Millenia
			Water Convention Opening Plenary	Thematic & Business Forums		
	Expo					
19 April (Tue)	Water Leaders Summit Plenary 1	WLS Plenary 2	WLS Plenary 3	WLS Plenary 4	Water Leaders Networking Reception	
	WC Parallel Session 1	WC Parallel Session 2	WC Parallel Session 3	WC Parallel Session 4		
	Thematic & Business Forums					Industry Night @ Water Expo
	Expo					
20 April (Wed)	WC Parallel Session 5	WC Parallel Session 6	WC Parallel Session 7	WC Closing Plenary		
	Thematic & Business Forums					
	Co-located Events					
	Expo					
21 April (Thurs)	Technical Site Visits					

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WATER CONVENTION 2022

The Water Convention is a platform for gathering professionals and technology providers from around the world to share their knowledge, practical experiences and novel technologies to address the current and emerging water challenges under the following themes:

- Theme 1: Delivering Water from Source to Tap (Network)
- Theme 2: Delivering Water from Source to Tap (Treatment)
- Theme 3: Effective and Efficient Wastewater Management (Treatment & Conveyance)
- Theme 4: Cities of the Future
- Theme 5: Water Quality and Health
- Theme 6: Nexus and Circularity

The Water Convention technical programme focuses on spurring knowledge sharing, fruitful discussions and engaging debates among water leaders and practitioners through high quality presentations on technological innovations, management strategies and best practices.

Water Convention Programme Guide

17 APRIL 2022, SUNDAY

VENUE	10.00am	11.00am	12.00pm	1.00pm	2.00pm	3.00pm	4.00pm	5.00pm
Room 1 (L3)	HIW1: Digital Transformation of the Water Sector and Role of Digital Twins – Part 1 <i>(Co-organized with SWAN Asia-Pacific Alliance)</i>					HIW1: Digital Transformation of the Water Sector and Role of Digital Twins – Part 2 <i>(Co-organized with SWAN Asia-Pacific Alliance)</i>		
Room 2 (L3)	HIW2: The Future of Seawater Desalination: Innovations in Desalting and Brine Management – Part 1 <i>(Co-organized with Gary Amy and Jonathan Clement)</i>					HIW2: The Future of Seawater Desalination: Innovations in Desalting and Brine Management – Part 2 <i>(Co-organized with Gary Amy and Jonathan Clement)</i>		
Room 3 (L3)	HIW4: Coastal Revitalisation – Emerging Lessons from Singapore for Small Island States					HIW3: Sustainable Wastewater Management in Developing Countries: An Innovative Indian Approach in River Rejuvenation		
Room 4 (L3)						HIW5: Reduction, Reuse and Recycling of Domestic Water – Benefits, Health Risks, and Consumers' Inclusivity		
Room 7 (L3)						HIW6: Water Sector Decarbonisation and Carbon Circularity		

HIW: Hot Issues Workshop

18 APRIL 2022, MONDAY

VENUE	11.00am	12.00pm	1.00pm	2.00pm	3.00pm	4.00pm	5.00pm
Grand Ballroom (L5)	Water Convention (WC) Opening Plenary						
Main Corridor (L3)						Water Convention Poster Session	

WATER CONVENTION 2022

19 APRIL 2022, TUESDAY

VENUE	9.00am	10.00am	11.00am	12.00pm	1.00pm	2.00pm	3.00pm	4.00pm	5.00pm
Room 1 (L3)	WC1.1: Planning, Design and Implementation			WC1.2: Efficiency of Operations – Tools for Overall Efficiency Optimisation			WC1.3: Asset Management and Network Renewal		WC1.4: Water Conservation and Efficiency Measures
Room 2 (L3)	WC2.1: Advanced Oxidation Process			WC2.2: Innovative Technologies to Tackle Emerging Contaminants			WC2.3: Advances in Membrane Technologies and Applications		WC2.4: Innovations in Desalination – Pretreatment
Room 3 (L3)	WC3.1: Membrane Technologies for Reuse			WC3.2: Membrane Bioreactor (MBR)			WC3.3: Membrane Aerated Biofilm Reactor (MABR)		WC3.4: Advances in Anaerobic Digestion (I)
Room 4 (L3)				WC3.8: Overflows, Tunneling and Climate Change			WC3.9: Corrosion in Conveyance Systems		WC3.10: Non-Municipal Wastewater Reuse
Room 5 (L3)	WC4.1: Digital Technology for Remote Sensing and Real Time Control			WC4.2: Digital Twins for Water Quality Management			WC4.3: City Water Resilience		WC4.4: Urban Adaptation Strategies
Room 7 (L3)	WC5.1: Water Quality Assessment and Management for Health Across The Full Water Spectrum: Treatment and Management			WC5.2: Water Quality Assessment and Management for Health Across The Full Water Spectrum: Realtime Sensors and Standards			WC5.3: Wastewater-based Epidemiology (I)		WC5.4: Wastewater-based Epidemiology (II)
Room 8 (L3)	WC6.1: Policy and Planning (I)			WC6.2: Policy and Planning (II)			WC6.3: Stakeholder Engagement and Cross-Sectoral Collaboration in the Circular Water Economy		WC6.4: System of Systems for a Circular Economy

WC: Water Convention

WATER CONVENTION 2022

20 APRIL 2022, WEDNESDAY

VENUE	9.00am	10.00am	11.00am	12.00pm	1.00pm	2.00pm	3.00pm	4.00pm	5.00pm
Room 1 (L3)	WC1.5: Digital Twin		WC1.6: Smart Sensors for Network Monitoring			WC2.8: Augmenting Water Supply by Water Reuse			
Room 2 (L3)	WC2.5: Innovations in Desalination – Energy saving		WC2.6: Resource Recovery from Brine			WC2.7: Digitalization of Water Treatment Plants			
Room 3 (L3)	WC3.5: Advances in Anaerobic Digestion (II)		WC3.6: Advances in Nutrient Removal			WC3.7: Resource Recovery			
Room 4 (L3)			WC3.11: Climate Change and Carbon Footprint Reduction			WC3.12: Next Generation of Intelligent Plant			
Room 5 (L3)	WC4.5: Water Master-Planning for Cities		WC4.6: Economic Valuation of Hybrid Infrastructure			WC4.7: Flood Resilience for Cities of the Future			
Room 7 (L3)	WC5.5: Water Quality Assessment and Management for Health Across the Full Water Spectrum: Risk Assessment		WC5.6: Systems Approaches to Service Delivery			WC5.7: Water Quality/Food Safety Nexus: From Safely Managed Drinking Water Through WSP to HACCP for Food Safety (Organised with FAO)			
Room 8 (L3)	WC6.5: Resource Circularity		WC6.6: Carbon Circularity			WC3.13: Integrated Approach in Removing Emerging Contaminants			
Room 11(L3)								Closing Plenary Best Poster Award Ceremony	

WC: Water Convention

WATER CONVENTION 2022 HOT ISSUES WORKSHOPS

The Water Convention 2022 Hot Issues Workshops will take place on Sunday, 17th April 2022 where emerging topics such as digital transformation of the water sector, future of seawater desalination, sustainable wastewater management, coastal revitalisation, consumer's inclusivity in reuse and recycling of domestic water and carbon circularity will be featured. These workshops will run on a highly interactive, panel discussion-based format, providing a focused platform to stimulate more open engagement between experts and delegates on 'hot' or emerging issues facing the water industry today. This will serve as the perfect opening to the technical sessions on 19th – 20th April 2022.

Hot Issue Workshops Programme 2022

The details of the six workshops are as follows:

WORKSHOP 1

Digital Transformation of the Water Sector and Role of Digital Twins (Co-organized with SWAN Asia-Pacific Alliance)

17 April 2022 (Sunday)

10.00 - 17.00 hours

Room 1, Level 3

Synopsis:

The pace of digital transformation has been accelerated by the COVID-19 pandemic which drove the need for working remotely. While digitalisation has improved operations, maintenance and customer service, concerns and issues remain in the implementation of digital solutions in the water sector. In the first part of the workshop, utilities will share the needs and challenges of the water sector today as they embark on their digital transformation journey. A panel of utilities, consultants and solution providers will then discuss on the solutions to overcome some of the challenges and what to expect in the road ahead. The second part of the workshop will focus on digital twins and their applications in different parts of the urban water cycle, from water treatment, distribution, used water collection, treatment, recycling and receiving waters. The workshop will end with a panel discussion on challenges and benefits of an integrated digital twin solution across the entire water loop.

Programme:

10.00 – 10.10: Welcome and Introduction (10 min)

Welcome and introduction by the moderator for first part of the workshop

- Mr. Amir Cahn, Executive Director, SWAN, UK

10.10 – 10.30: Presentations on Overview of Digital Transformation in the Water Sector (2 x 10 min, i.e. 20 min)

1. Overview of digital transformation in water collection, treatment, and distribution network

- Mr. Miguel Ángel Ayllón Mesa, Head of Drinking Water, Global Omnium, Spain

2. Overview of digital transformation in used water collection, treatment, and reuse

- Mr. Thomas Kuczynski, VP of Information Technology, DC Water, US (remote participant)

10.30 – 11.00: Presentations on Challenges of Digital Transformation in the Water Sector (3 x 10 min, i.e. 30 min)

1. Human resistance to change

- Ms. Jennifer Rebeiro, CIO, Greater Western Water, Australia

2. Solutions and systems in silos

- Mr. Min Zhong, Asset Information Management Lead, NEOM, Saudi Arabia

3. Cybersecurity

- Ms. Barbara Wilson, Vice President of Technology Programs, Ampcus Inc., US (remote participant)

11.00 – 11.30: Q & A (30 min)

11.30 – 12.00: Tea Break (30 min)

12.00 – 13.00: Panel Discussion on Solutions in the Digital Transformation of the Water Sector (60 min)

WATER CONVENTION 2022

HOT ISSUES WORKSHOPS

Moderator: Mr. Amir Cahn, Executive Director, SWAN, UK

Panellists:

- Mr. Ridzuan Ismail, Director Water Supply Network, PUB, Singapore
- Mr. Eric Skowron, Three Waters Network Strategy Executive, ProjectMax Ltd, NZ (remote participant)
- Ms. Gigi Karmous-Edwards, Founder & Co-chair of SWAN Digital Twin H2O Work Group, US
- Mr. Jesper Kjelds, Chief Digital Information Officer, Aarhus Vand, Denmark (remote participant)
- Ms. Maree Lang, Managing Director, Greater Western Water, Australia

13.00 – 14.00: Lunch Break (60 min)

14.00 – 14.15: Welcome and Introduction (15 min)

Welcome and introduction by the moderator for second part of the workshop

- Mr. Andrew Shaw, Associate Vice President, Black & Veatch, US

14.15 – 15.00: Presentations on Digital Twins (3 x 15 min, i.e. 45 min)

1. Overview of SWAN's digital twin architecture

- Ms. Gigi Karmous-Edwards, Founder & Co-chair of SWAN Digital Twin H2O Work Group, US

2. Case study of digital twin in water collection, treatment, and distribution network

- Dr. Ting Lu, Business Practice Leader for Digital Solutions, Clean Water Services, US (remote participant)

3. Case study of digital twin in used water collection, treatment, and reuse

- Dr. Tao Guihe, Principal Specialist (Water Reclamation), PUB, Singapore

15.00 – 15.30: Q & A (30 min)

15.30 – 16.00: Tea Break (30 min)

16.00 – 17.00: Panel Discussion on One Twin to Rule Them All? (60 min)

Moderator: Mr. Albert Cho, Senior Vice President, Xylem, US

Panellists:

- Mr. Melvin Koh, Director Joint Operations, PUB, Singapore
- Ms. Agnethe Pedersen, Industrial PhD student, VCS Denmark
- Mr. Iznul Muazim, Project Manager, SWAN Asia-Pacific, Malaysia
- Mr. Andy Smith, Smart Water Strategy Manager, Anglian Water Services, UK (remote participant)
- Mr. Chengzi Chew, Business Development Manager, DHI, Denmark

WORKSHOP ②

The Future of Seawater Desalination: Innovations in Desalting and Brine Management (Co-organized with Gary Amy and Jonathan Clement)

17 April 2022 (Sunday)
10.00 – 17.00 hours
Room 2, Level 3

Synopsis:

The current state-of-the-art in seawater desalination is standard pre-treatment, single-stage seawater reverse osmosis (SWRO) with a recovery of about 50 %, and brine disposal by an outfall diffuser, with challenges identified in the operation of conventional SWRO. High energy consumption by SWRO has led to innovations in membrane materials and process configurations. In addition, there is increasing interest in valorisation of SWRO brines and concomitant recovery of valuable materials to contribute to the circular economy. In this workshop, high level speakers from industry and academic researchers will share their expertise on SWRO pre-treatment innovations, SWRO materials and processes innovations, and valorisation of SWRO brines and valuable materials recovery. Selected industry panellists will then share their innovations in desalination membrane and processes followed by panel discussion on the future of seawater desalination.

Programme:

10.00 -10.10: Welcome, Introduction, and Setting the Stage (10 min)

Welcome, introduction, and setting the stage by the moderator for first part of the workshop

- Mr. Jonathan Clement, CTO Advanced Water Treatment, Ramboll, The Netherlands

10.10-10.25: Presentation on Improving Energy Efficiency of RO Processes for Seawater Desalination and Brine Concentration (15 min, including 3 min of Q&A/discussion)

- Prof. Seungkwan Hong, Professor, Korea University, South Korea

10.25-10.40: Presentation on Advancing Membrane Materials and Technologies for Seawater Desalting and Brine Concentration (15 min, including 3 min of Q&A/discussion)

- Prof. Eric Hoek, Professor, University of California, Los Angeles, USA (*remote participant*)

10.40-10.55: Presentation on Reverse Osmosis Biofouling: Emerging Assessment Tools and Control (15 min, including 3 min of Q&A/discussion)

- Prof. Hans Vrouwenvelder, Director Water Desalination and Reuse Center, KAUST, Saudi Arabia

11.00-11.30: Tea Break (30 min)

11.30-11.45: Presentation on Advances in Membrane Distillation and Forward Osmosis for Desalting and Brine Concentration (15 min, including 3 min of Q&A/discussion)

- Prof. Gary Amy, Dean's Distinguished Professor, Clemson University, USA

11.45-12.00: Presentation on Blending Opportunities in Seawater Desalination to Reduce Energy and Environmental Impacts (15 min, including 3 min of Q&A/discussion)

- Prof. Amy Childress, Professor, University of Southern California, USA

12.00-12.15: Presentation on Envisioning Zero Liquid Discharge at a SWRO Facility with Materials Recovery (15 min, including 3 min of Q&A/discussion)

- Mr. Robert Garner, Director Water Supply, NEOM, Saudi Arabia

12.15-12.30: Presentation on Ocean Brine Mining for Valuable Minerals - the Path Forward (15 min, including 3 min of Q&A/discussion)

- Dr. Nikolay Voutchkov, President, Water Globe Consultant, USA

12.30-12.45: Presentation on Green Chemicals for Desalination and Brine Management (15 min, including 3 min of Q&A/discussion)

- Dr. Ahmed Al Amoudi, Director General of the Desalination Technology Research Institute (DTRI) of the Saline Water Conversion Corporation (SWCC), Saudi Arabia

12.45-14.00: Lunch Break (75 min)

14.00-14.10: Welcome and Introduction (10 min)

Welcome and Introduction by the moderator for second part of the workshop

- Prof. Gary Amy, Dean's Distinguished Professor, Clemson University, USA

14.10-15.00: Presentations by Industry Panellists (7 x 7 min, i.e. 49 min)

1. The Growing Benefit of Ion Selective Nanofiltration in Desalination

- Dr. Craig Bartels, Vice President Technology, Hydranautics, USA (remote participant)

2. Brine Concentration Beyond 200 ppt – Know How and Experience

- Mr. Keith Lampi, President, Fluid Technology Solutions, USA (remote participant)

3. Development and Operation of High Permeability SWRO Membranes

- Dr. Boris Liberman, CTO and Vice President, IDE Technologies, Israel

4. Seawater Pretreatment with High Efficiency Microsand Filter

- Dr. Xiangyi Qiao, Technology Manager, Evoqua Water Technologies, Singapore

5. Aquaporin-Based Membranes: Translating Fundamental Science into Technology

- Prof. Claus Hélix-Nielsen, Head of Department, Technical University of Denmark, Denmark

6. Ceramic Membranes for Pre-Treatment

- Mr. Michael Shaw, Director of Product Management, Nanostone, USA

7. Energy Efficiency, Sustainability, and the Future of Seawater Desalination: A Toray Perspective

- Mr. Victor Verbeek, General Manager for Toray Membrane Australia, Australia

15.00-15.30: Panel Discussion on Industry Perspectives (30 min)

Moderator: Prof. Gary Amy, Dean's Distinguished Professor, Clemson University, USA

Panellists:

- Dr. Craig Bartels, Vice President Technology, Hydranautics, USA (remote participant)
- Mr. Keith Lampi, President, Fluid Technology Solutions, USA (remote participant)
- Dr. Boris Liberman, CTO and Vice President, IDE Technologies, Israel
- Dr. Xiangyi Qiao, Technology Manager, Evoqua Water Technologies, Singapore
- Prof. Claus Hélix-Nielsen, Head of Department, Technical University of Denmark, Denmark
- Mr. Michael Shaw, Director of Product Management, Nanostone, The Netherlands
- Mr. Victor Verbeek, General Manager for Toray Membrane Australia, Australia

15.30-16.00: Tea Break (30 min)

16.00-17.00: Facilitated Discussion on the Future of Seawater Desalination? (60 min)

Facilitators:

- Mr. Jonathan Clement, CTO Advanced Water Treatment, Ramboll, The Netherlands
- Prof. Gary Amy, Dean's Distinguished Professor, Clemson University, USA

Note: entire audience and speakers will be involved in this session.

WORKSHOP 3

Sustainable Wastewater Management in Developing Countries: An Innovative Indian Approach in River Rejuvenation

17 April 2022 (Sunday)

14.00 – 17.00 hours

Room 3, Level 3

Synopsis:

Developing countries have enormous challenges yet with increasing role in Global Leadership, India is committed towards meeting UN's SDGs particularly SDG 6 in all respect. It is with this focussed approach, the first Governance challenge was met when Govt. of India in 2014-2015 launched 'Namami Gange' (Clean Ganga), a flagship programme under Ministry of Jal Shakti, (erstwhile Ministry of Water Resources) for protection, conservation, and rejuvenation of River Ganga and its tributaries. The dedicated efforts of NMCG, Government of India and active stakeholder engagement has led to the identification of governance issues and technological challenges which hindered the Indian wastewater sector. Subsequently, innovative methods were developed which not only mitigated the problem of pollution created through domestic sewage and industrial effluents but also ushered in a paradigm shift in the water sector. NMCG also extensively worked on other components such as, solid and liquid waste management, restoring biodiversity, afforestation, wetland conservation, river and people connect etc. to holistically rejuvenate the entire riverine ecosystem. In this workshop, speaker presentations from NMCG, GoI and allied partners will share experiences on effective and efficient wastewater management in Indian context. The panellists from other developed and developing countries will share their viewpoint on the Indian experience and through this discussion, various other countries may also derive inspiration from the work and models adopted by India.

Programme:

14.00 – 14.05: Welcome and Introduction (5 min)

Welcome and Introduction by the Moderator

- Dr. Nupur Bahadur, Senior Fellow & Head, NMCG-TERI Centre of Excellence on Water Reuse, Water Resources Division, The Energy & Resources Institute (TERI), India

14.05 – 14.15: Presentation on Status of Wastewater Generation, Treatment and Management in India: Success Through NMCG initiatives (10 min)

- Mr. G. Asok Kumar, Director General, NMCG, Ministry of Jal Shakti, Govt. of India, India (*remote participant*)

14.15 – 14.35: Presentations on Innovative Approaches, Governance Models and Technologies Adopted in Wastewater Management (2 x 10 min, i.e. 20 min)

- Mr. K P Bakshi, Former Chairman, Maharashtra Water Resources Regulatory Authority, USA (*remote participant*)
- Mr. D P Mathuria, Executive Director (Technical), NMCG, Ministry of Jal Shakti, Govt. of India, India (*remote participant*)

14.35 – 15.05: Presentations on Role of Private Sector, International Funding and Newer Models of Asset Creation and Management: Success Stories & Best Practices (3 x 10 min, i.e. 30 min)

1. The City of Chennai

- Mr. Rajneesh Chopra, Global Head- Business Development, VA Tech WABAG, India

2. The City of Prayagraj

- Mr. K P Maheshwari, CEO, Adani Water, India (*remote participant*)

3. The City of Surat

- Mr. Banchhanidhi Pani, Municipal Commissioner, Surat Municipal Corporation, India (*remote participant*)

15.05 – 15.20: Presentation on Co-creation of Knowledge Base, Research and Development Ecosystem and People's Connect (15min)

- Mr. Rajiv Ranjan Mishra, Independent Expert, Centre for Ganga River Basin Management and Studies (c-Ganga), India

15.20 – 15.45: Q & A (25 min)

15.45 – 16.15: Tea Break (30 min)

16.15 – 17.00: Panel Discussion (45 min)

Moderator: Prof. Kalanithy Vairavamoorthy, Executive Director, IWA, UK

Panellists:

1. Mr. G. Asok Kumar, Director General, NMCG, Ministry of Jal Shakti, Govt. of India, India (*remote participant*)
 2. Dr. Valerie Naidoo, Executive Manager, Business & Innovations, Water Research Commission (WRC), South Africa (*remote participant*)
 3. Mr. Madhav Belbase, Former Secretary, Nepal Water Supply Ministry, Nepal
 4. Mr. Sumouleendra Ghosh, Associate Partner and Global Water Lead, KPMG, India
 5. Mr. Xavier Chauvot De Beauchene, Lead Water & Sanitation Specialist, World Bank, Morocco (*remote participant*)
 6. Prof. Tony Wong, Chair of Water Sensitive Cities Think Tank, Monash University, Australia
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WORKSHOP 4

Coastal Revitalisation - Emerging Lessons from Singapore for Small Island States

17 April 2022 (Sunday)

10.00 – 13.00 hours

Room 3, Level 3

Synopsis:

In the first part of this workshop, PUB will provide an overview of the coastal protection strategy in Singapore followed by presentations from Singapore-based researchers on innovative technologies for coastal protection. In the second part of this workshop, unique challenges faced by Small Island States will be presented followed by a presentation from Deltares to provide insights on transferrable lessons from Singapore to small island states. This workshop will then be concluded by a brainstorming session to identify future challenges and risks to small island states and potential solutions to overcome some of the challenges.

Programme:

Part 1: Innovations from Singapore

10.00 – 10.05: Welcome and Introduction (5 min)

Welcome and Introduction by the Moderator for Part 1

- Prof. Tony Wong, Chair of Water Sensitive Cities Think Tank, Monash University, Australia

10.05 – 10.20: Presentation on PUB's Perspectives on Coastal Protection in Singapore (15 min)

- Ms. Hazel Khoo, Director, Coastal Protection Department, PUB, Singapore

10.20 – 10.45: Presentations on Innovative Technologies for Coastal Protection (25 min)

1. Our Future Coast – Flexible & Hybrid Protection for Climate Change Adaptation (15 min)

- Mr. Bas Reedijk, Head of Coastal Engineering and Water Management Department, Delta Marine Consultants, The Netherlands

2. Sustainable Coastline Regeneration Using Nature-Based Solutions, a Case Study in Bintan, Indonesia (5 min)

- Mr. Jair Smits, Managing Director, Witteveen+bos South-East Asia Pte Ltd, Singapore

3. Records of Past and Present Sea-level Changes in Singapore as Constraints for Future Projections (5 min)

- Dr Timothy Shaw, Senior Research Fellow, Earth Observatory of Singapore, Nanyang Technological University, Singapore

10.45 – 11.15: Q & A (30 min)

11.15 – 11.45: Tea Break (30 min)

Part 2: Transferrable Lessons from Singapore to Small Island States

11.45 – 11.50: Welcome and Introduction (5 min)

Welcome and Introduction by the Moderator for Part 2

- Mr. Piet Dircke, Global Leader Resilience and Water Management, Arcadis, the Netherlands

11.50 – 12.20: Presentations on Transferable Lessons to Small Island States (30 min)

- 1. Overview of the situation and needs for coastal protection in Fiji and perspectives on the relevance and adaptability of coastal protection's technologies from part 1 (15 min)**
 - Mr. Joshua Wycliffe, CEO & Permanent Secretary, Ministry of the Environment, Fiji (remote participant)
- 2. Coastal management in small island states, making use of evolutionary best practices from Singapore and The Netherlands (15 min)**
 - Mr. Tjitte A. Nauta, Regional Manager Asia, Deltares, The Netherlands

12.20 – 12.50: Panel Discussion (30 min)

Moderator: Mr Piet Dircke, Global Leader Resilience and Water Management, Arcadis, the Netherlands

Panellists:

- Ms. Hazel Khoo, Director, Coastal Protection Department, PUB, Singapore
- Mr. Bas Reedijk, Head of Coastal Engineering and Water Management Department, Delta Marine Consultants, Singapore
- Mr. Jair Smits, Managing Director, Witteveen+bos South-East Asia Pte Ltd, Singapore
- Dr Timothy Shaw, Senior Research Fellow, Earth Observatory of Singapore, Nanyang Technological University, Singapore
- Mr. Joshua Wycliffe, CEO & Permanent Secretary, Ministry of the Environment, Fiji (remote participant)
- Mr. Tjitte A. Nauta, Regional Manager Asia, Deltares, The Netherlands

12.50 – 13.00: Summary and Closing Remarks (10 min)

Summary and Closing Remarks by the Moderator for Part 1 and 2

- Prof. Tony Wong, Chair of Water Sensitive Cities Think Tank, Monash University, Australia
 - Mr Piet Dircke, Global Leader Resilience and Water Management, Arcadis, the Netherlands
-

WORKSHOP 5

Reduction, Reuse and Recycling of Domestic Water – Benefits, Health Risks, and Consumers' Inclusivity

17 April 2022 (Sunday)

14.00 – 17.30 hours

Room 4, Level 3

Synopsis:

Across the world, consumers demand 24/7 access to safe, wholesome and aesthetically pleasing water. However, behavioural changes to become “greener”, population growth, climate change, emergence of new chemicals and increasing scarcity of quality water sources have led to adaptations made to the water distribution infrastructure and management, including of internal and community water systems. Ideas that were once “on the fringe” (e.g. rainwater harvesting) have become mainstream options. The awareness required of consumers and practitioners in this evolving context, to ensure public health is not adversely impacted, has not kept pace with the changes in the way water in homes, communities and public buildings is delivered. The end users/consumers seem least represented in conversations about water and yet they must be included if they are to become aware of the impacts of their water use behaviours. Public confidence in water supplies is essential and access to safe water is a fundamental human right. However, it is consumed with little awareness and consideration of the health risks and benefits. This workshop will discuss the health dimensions of reducing domestic water use and re-using and recycling water for safe consumptions, the evolution of standards and good practice in plumbing to protect health and the importance of consumer inclusivity in balancing risks and benefits in the water sector's efforts to achieve universal access against the backdrop of growing constraints.

Programme:

14.00 – 14.05: Welcome and Introduction to the First Part of the Workshop (5 min)

Welcome and Introduction by the Anchor Person

- Ms. Fiona Waller, Head of Water Quality, Affinity Water Ltd, UK

14.05 – 14.25: Presentation on Water Reclamation, Re-Use and Public Health (20 min)

- Mr. Ian Law, Principal, IBL Solutions, Australia

14.25 – 14.40: Presentation on Direct Potable Reuse – Overcoming Customer Perceptions (15 min)

- Dr. Greg Ryan, Director Business Excellence, Water Services Association of Australia, Australia

14.40 – 14.55: Presentation on Rainwater Harvesting and Grey Water Systems: Assessing and Quantifying Hazards to Public Health (15 min)

- Dr. David Cunliffe, Principal Water Quality Advisor, South Australia Health, Australia (remote participant)
- Dr. Daniel Deere, Director of Water Futures and freelance Water, Sanitation and Hygiene (WASH) consultant, Water Futures Pty Ltd, Australia

14.55 – 15.05: Quick Q&A led by the Anchor Person (10 min)

Anchor Person: Ms. Fiona Waller, Head of Water Quality, Affinity Water Ltd, UK

15.05 – 15.30: Panel Discussion on Solutions for Maintaining Public Health in Domestic Premises with Novel Water Systems, Appliances, and Demand Reduction Devices (25 min)

Moderator: Prof. Shane Snyder, Professor of Civil & Environmental Engineering and Executive Director of the Nanyang Environment & Water Research Institute (NEWRI), Nanyang Technological University (NTU), Singapore

Panellists:

- Prof. Hamanth Kasan, Honorary Research Professor, Institute for Water and Wastewater Technology, Durban University of Technology and Vice President of the International Water Association, Johannesburg, Republic of South Africa
- Dr. Vijay Sundaram, National Water Reuse Technical Practice Leader, Aecom, USA
- Mr. Ian Law, Principal, IBL Solutions, Australia
- Dr. Greg Ryan, Director Business Excellence, Water Services Association of Australia, Australia

15.30 – 16.00: Tea Break (30 min)

16.00 – 16.05: Introduction to the Second Part of the Workshop (5 min)

Introduction by the Anchor Person

- Ms. Fiona Waller, Head of Water Quality, Affinity Water Ltd, UK

16.05 – 16.20: Presentation on Managing Water in Buildings – Competencies Required for Design, Installation and Plumbing (15 min)

- Dr. Yu Man Tat, Senior Chemist, Hong Kong Water Supplies Department, China (*remote participant*)

16.20 – 16.35: Presentation on Plumbing Standards and Codes of Practice from a Regulator's Perspective (15 min)

- Mr. Rajendram M Ramasamy, Senior Engineer (Water Supply Network), PUB, Singapore

16.35 – 16.50: Presentation on Approaches for Health Protection in Small Drinking-water Supplies (15 min)

- Dr. Rory Moses McKeown, Senior Technical Consultant, World Health Organization, Ireland (*pre-recorded presentation*)

16.50 – 17.00: Presentation on Implementation and Scaling Up Onsite Non-potable Water Systems (10 min)

- Ms. Paula Kehoe, Director of Water Resources, San Francisco Public Utilities Commission, USA

17.00 – 17.30: Panel Discussion (30 min)

Moderator: Dr. Daniel Deere, Director of Water Futures and freelance Water, Sanitation and Hygiene (WASH) consultant, Water Futures Pty Ltd, Australia

Panellists:

- Mr. Chinnasamy Subramanian, Executive Committee, Singapore Plumbing Society, Singapore
- Dr. Yu Man Tat, Senior Chemist, Hong Kong Water Supplies Department, China (*remote participant*)
- Ms. Paula Kehoe, Director of Water Resources, San Francisco Public Utilities Commission, USA

WORKSHOP 6

Water Sector Decarbonisation and Carbon Circularity

17 April 2022 (Sunday)

14.00 – 17.30 hours

Room 7, Level 3

Synopsis:

While the water sector has gone through different stages of revolution, from reclaiming used water to recovering resources, there remains a leap for the next step of achieving carbon neutrality or negative emission. This workshop will provide an overview of the challenges and strategies of the water sector's pathway to net zero emissions, developments in the green energy sector, process innovations in desalination and wastewater treatment to reduce carbon emission as well as implementations of late-stage research technology. A panel of utilities, companies, and associations from developed and developing countries will then discuss on challenges and key strategies to net zero..

Programme:

14.00 – 14.15: Welcome and Introduction (15 min)

Welcome and Introduction by the Moderator

- Dr Pang Chee Meng, Chief Engineering and Technology Officer, PUB, Singapore

14.15 – 14.30: Opening Presentation (15 min)

PUB's Sustainability Master Plan

- Ms Chong Mien Ling, Director of Policy & Planning, PUB, Singapore

14.30 – 15.00: Presentations on Green Energy (3 x 10 min, i.e. 30 min)

1. The Path to a Hydrogen Future

- Mr Francis Pamminger, Manager Strategic Research, Yarra Valley Water, Australia (*remote participant*)

2. Green Hydrogen Generation from Water and Solar Energy

- Mr Jos Boere, Director, Allied Waters, The Netherlands (*remote participant*)

3. Zero Carbon Lithium

- Dr Francis Wedin, Chief Executive Officer, Vulcan Energy, UK (*remote participant*)

15.00 – 15.30: Presentations on Reducing Energy and Moving Towards Neutrality (3 x 10 min, i.e. 30 min)

1. Energy Efficient Water Desalination: Closed Circuit RO (CCRO)

- Dr Santhosh Ramalingam, Technical Services Manager, DuPont, Singapore

2. Enhancing Energy Efficiency of Wastewater Treatment

- Mr Per Henrik Nielsen, Project Director, VCS Denmark, Denmark

3. Decarbonization at DC Water: Achieving Benefits Beyond Carbon

- Dr Matt Ries, Director, Sustainability & Watershed Management, DC Water, USA

15.30 – 16.00: Q & A (30 min)

16.00 – 16.30: Tea Break (30 min)

16.30 – 17.30: Panel Discussion on Key Strategies and Challenges to Net Zero (60 min)

Moderator: Ms Cindy Wallis-Lage, Executive Director, Black & Veatch, USA (*remote participant*)

Panellists:

- Mr Walid Khoury, General Manager, Desalytics Water Solutions, UAE
- Mr Chris Williams, General Manager, Integrated Planning, Melbourne Water, Australia (*remote participant*)
- Dr Jiawei Wang, R&D Director, Beijing Drainage Group, China (*remote participant*)
- Ms Claudia Toussaint, Chief Sustainability Officer, Xylem, USA (*remote participant*)
- Prof. Mark van Loosdrecht, Chair Professor in Environmental Biotechnology, Delft University of Technology, The Netherlands

WATER CONVENTION 2022 OPENING PLENARY

18 April 2022 (Monday)

11.00 – 13.00 hours

Grand Ballroom, Level 5

According to the Sixth IPCC Assessment Report published in 2022, climate change and extreme events are increasingly impacting nature and people's lives everywhere. From disrupted water networks, contaminated water supplies to its resulting impact on agriculture and human health, these are just a few examples of its far-reaching effects on the global water scene and its communities.

Join us at the **Water Convention Opening Plenary** on 18 April 2022, where global water leaders will gather to discuss this issue. Keynote presentations delivered will touch on areas such as approaches to SDG6 targets, the impact of climate change on water systems, financing climate change mitigation initiatives in water and adjacent sectors as well as present and future water challenges.

Speakers:



Tom Mollenkopf,
President,
International Water
Association



Dr Patrick Moriarty,
CEO,
IRCWASH



Dr Debra Roberts,
Co-Chair,
Working Group II
(Impacts, Adaptation and
Vulnerability), IPCC



**Jennifer Sara, Global
Director,**
Water Global Practice,
The World Bank



Dr Oyun Sanjaasuren,
Director of External
Affairs,
Green Climate Fund



Bernard Koh,
Assistant Chief
Executive
Future Systems and
Technology, PUB,
Singapore's National Water
Agency



**Darryl Day, Chief
Executive Officer,**
The Peter Cullen Water and
Environment Trust

Moderator:



Kala Vairavamoorthy,
Executive Director,
International Water
Association

WATER CONVENTION 2022 POSTER SESSION

18 April 2022 (Monday)

15.45 – 17.45 hours

Main Corridor, Level 3

Join us at the poster session to interact with the authors of over 100 posters on display.

Vote for your favourite posters by scanning the QR code on the right with your personal mobile device.



Cast your votes by 19 April 2022 (Tuesday), 4.00pm.

Authors with the best posters will receive a certificate and stand a chance to win the following prizes:

BEST POSTER PRIZE: iPhone 13 (128GB Midnight Blue)

4 RUNNER-UP PRIZES: 4 iPad Wifi (64GB Silver)

BEST STUDENT POSTER PRIZE: Book Voucher worth £250 from IWA Publishing

2 BEST STUDENT RUNNER-UP PRIZES: Book Vouchers worth £150 each from IWA Publishing



WATER CONVENTION 2022 CLOSING PLENARY

18 April 2022 (Monday)

15.45 – 17.45 hours

Main Corridor, Level 3

Join us at the Closing Plenary to hear reflections of the conference proceedings from Young Water Professionals and witness the Best Poster Awards Ceremony.

Theme 1: Delivering Water from Source to Tap – Network

▶ Session 1.1 - Planning, Design and Implementation

19 April 2022 (Tuesday)

0900 – 1030 hours

Room 1, Level 3

Session Co-Chairs: Hamanth Kasan, IWA (South Africa), Mark Wilton, Aurecon (Australia)

▶ Overview On Network Planning (Virtual)

Cindy Wallis-Lager. Black & Veatch (USA)

Optimising Pipeline Planning and Design Enhanced with Artificial Intelligence in England

Jon Tang. Mott Macdonald (Singapore)

Spot 2023tm: Performance and Operational Transformation for Effective Network Management

Jonathan Piveteau. Suez (France)

Adaptive Planning Tools in a Deeply Uncertain and Complex Future

Apra Boyle-Gotla. Watercare (New Zealand)

▶ Session 1.2 - Efficiency of Operations – Tools for Overall Efficiency Optimisation

19 April 2022 (Tuesday)

1100 – 1230 hours

Room 1, Level 3

Session Co-Chairs: Raziye Farmani, University of Exeter (United Kingdom), Doeke Schippers, Vitens (Netherlands)

▶ Overview On Tools for Network Optimisation (Virtual)

Ir. Abas Abdullah. Air Selangor (Malaysia)

Model Predictive Control in Water Distribution: Operations, Workflow & Experiences

Sten Linberg. DHI (Denmark)

Using Edge Analytics and Digital Twin Technology to Optimize Pump System Performance & Asset Management

Matt Rolls. Specific Energy (United Kingdom)

Real-Time Software for Distribution System Operations: An Operator-Focused Design Approach

Ashley Ng, Xylem (Singapore)

Theme 1: Delivering Water from Source to Tap – Network

▶ **Session 1.3 – Asset Management and Network Renewal**

19 April 2022 (Tuesday)

1400 – 1530 hours

Room 1, Level 3

Session Co-Chairs: Zdravka Do Quang, SUEZ (France), Iman Jafari, NUS (Singapore)

▶ **Testing A Novel Leak Detection Method At DMA Level**

Martijn Deenan. Royal Haskoningdhv (Netherlands)

CALM NETWORK: Reduction of Impact Due to Transients in Macao Water Networks (Virtual)

Zhao Yu. Macao Water (China)

Development of a High-Resolution Non-Invasive System to Assess The Condition of Buried Pipeline Infrastructure

Joseph Butterfield. Mueller Water Products (United Kingdom)

Leak Localization and Benchmarking NRW Via Daily Model Calibration with Continuously Monitoring Data

Zheng Yi Wu. Bentley Systems Incorporated (United States)

▶ **Session 1.4 – Water Conservation and Efficiency Measures**

19 April 2022 (Tuesday)

1600 – 1730 hours

Room 1, Level 3

Session Co-Chairs: Ridzuan Ismail, PUB, Singapore's National Water Agency (Singapore), Michael John Webster, City of Cape Town (South Africa)

▶ **Overview On Water Conservation and Efficiency Measures**

David Johnson. South Nevada Water Authority (United States)

An Exploration of Water Use Intensity in The Non-Domestic Sector in Singapore

Joost Buurman. Institute of Water Policy, Lkyspp, NUS (Singapore)

Making 50 Liters of Daily Water Use Per Person A Reality (Virtual)

Braulio Eduardo Morera. 50L Home Coalition (Switzerland)

Policy for Sound Water Stewardship (Virtual)

Sarah Porter. Kyl Center for Water Policy at Morrison Institute, Arizona State University (Switzerland)

Theme 1: Delivering Water from Source to Tap – Network

▶ **Session 1.5 – Digital Twin**

20 April 2022 (Wednesday)

0900 – 1030 hours

Room 1, Level 3

Session Co-Chairs: Albert Cho, Xylem (United States), David Johnson, South Nevada Water Authority (United States)

▶ **Dynamic Digital Twins – The Past, Present and Future State of Networks with Data Driven and Physics Based Models**

Patrick Bonk. Innovyze (Australia)

Building A Business Case for Intelligent Water: Applications of AI and Digital Twins

James Cooper. Arcadis (United States)

A Digital Water Company

Doeke Schippers. Manager, Extraction & Treatment, Vitens (The Netherlands)

Establishing A Distribution System Digital Twin for Real-Time Water Quality and Energy Management at Hillsborough County Public Utilities

James Uber. Xylem, Inc (United States)

▶ **Session 1.6 – Smart Sensors for Network Monitoring**

20 April 2022 (Wednesday)

1100 – 1230 hours

Room 1, Level 3

Session Co-Chairs: Amir Cahn, SWAN (Israel), Martijn Deenen, Royal Haskoningdhv (The Netherlands)

▶ **Smart Technology for Network Monitoring (Virtual)**

Dammika Vintanage. Sydney Water (Australia)

Power of Low-Resolution Pressure Data

James Smith. Xylem (United States) Jihane Kalloul

NB-IoT Coverage Study for Smart Metering in Singapore

Wee Beng Lim. PUB, Singapore's National Water Agency (Singapore)

Monitoring of Water Quality Changes Due to Rising Temperatures During Production, Storage and Distribution

Christopher Wagner. S::can Gmbh (Austria)

Thames Water AMI Programme (Virtual)

Andrew Tucker. Thames Water (United Kingdom)

Theme 2: Delivering Water from Source to Tap – Treatment

▶ Session 2.1 – Advanced Oxidation Process

19 April 2022 (Tuesday)

0900 – 1030 hours

Room 2, Level 3

Session Co-Chairs: Min Yang, Chinese Academy of Sciences (China), Jaehong Kim, Yale University (United States)

▶ Membrane-Confined Heterogeneous Advanced Oxidation

Jaehong Kim, Yale University (United States)

World's First Sequential Advanced Oxidation Process Installation for Efficient and Safe Drinking Water Production (Virtual)

Steffen Ruetting, Xylem Inc (Germany)

Bromate Formation and Mitigation in Low Bromide Water from Ozone Upgrading

Fong Eddy, Binnies Singapore (Singapore)

Enhanced Solar Light-Driven Photocatalytic Ppcps Degradation by Chlorine Activation for Drinking Water Treatment (Virtual)

Cheuk Wai Lung, The Hong Kong University of Science and Technology (Hong Kong SAR)

▶ Session 2.2 – Innovative Technologies to Tackle Emerging Contaminants

19 April 2022 (Tuesday)

1100 – 1230 hours

Room 2, Level 3

Session Co-Chairs: Hadas Manane, Tel Aviv University (Israel), Shane Snyder, Nanyang Technological University, Nanyang Environment and Water Research Institute (Singapore)

▶ Opening Presentation

Shane Snyder, Nanyang Technological University, Nanyang Environment and Water Research Institute (Singapore)

Electrochemical Mineralization of A Concentrated Antibiotic Stream and Toxicity Assessment of Its By-Products

Orlando Garcia Rodriguez, National University of Singapore (Singapore)

PFAS Challenges and The Emerging Technologies: A Utility Point of View (Virtual)

Morez Jafari, PWNT (Netherlands)

Pilot Study of An Ion Exchange Resin Regenerated with Alternative Bicarbonate Counter Ion for The Removal of Natural Organic Matter

Elisabeth Vaudevire, PWNT (Netherlands)

Impact of Reduced Regeneration Frequency on The Ion Exchange (Virtual)

Lucie Pidoux, Cranfield University (United Kingdom)

Theme 2: Delivering Water from Source to Tap – Treatment

▶ **Session 2.3 – Advances in Membrane Technologies and Applications**

19 April 2022 (Tuesday)

1400 – 1530 hours

Room 2, Level 3

Session Co-Chairs: Seung Kwan Hong, Korea University (South Korea), Wang Rong, Nanyang Technological University (Singapore)

▶ **Development of Pilot-Scale High-Performance Bio-Programmable Membranes for Water Reclamation Process**

Wang Rong. National Technological University (Singapore)

Innovative Chloramine Free Water Reuse Technology, 85% Recovery, 28 Lmh, Single Stage, 100% Uvt, Water Cost Saving 20% (Virtual)

Boris Liberman. IDE Water Technologies (Israel)

DuPont™ B-Free™ – The Biofouling Prevention Technology (Virtual)

Guillem Gilabert-oriol. Dupont Water Solutions (Spain)

Investigation and Optimization of The Ozone-Ceramic Membrane Process

Moses Shijie Leow. Nanyang Technological University (Singapore)

▶ **Session 2.4 – Innovations in Desalination – Pre-Treatment**

19 April 2022 (Tuesday)

1600 – 1730 hours

Room 2, Level 3

Session Co-Chairs: Puah Aik Num, PUB, Singapore's National Water Agency (Singapore), Gary Amy, Clemson University (United States)

▶ **Innovative Highly Resource Efficient Configuration for Seawater Desalination**

Olga Ferrer. ACCIONA (Spain)

Evaluation of a Ceramic Membrane for Improved Pre-Treatment of Desalination

Isaac Ng. Nanostone (The Netherlands)

High Efficiency Cross-Flow Microsand Filtration as Pre-treatment in Desalination Applications

Kris Lim. Evoqua Water Technologies (Singapore)

Breakthrough Dry-Tested Seawater Reverse Osmosis Elements

Santhosh Ramalingam. Dupont (Singapore)

Theme 2: Delivering Water from Source to Tap – Treatment

▶ **Session 2.5 – Innovations in Desalination - Energy Saving Technologies**

20 April 2022 (Wednesday)

0900 – 1030 hours

Room 2, Level 3

Session Co-Chairs: Seung Kwan Hong, Korea University (Korea)

▶ **Novel PRO Membranes for Salinity Gradient Energy Harvesting: Towards Scale Up and Pilot Validation of 4 Inch and 8inch Modules**

Chakravarthy Gudipati. Nanyang Technological University (Singapore)

Filmtec™ NF270-440 – Energy Savings in Nanofiltration by New Module Design

Javier Saurez. Dupont Water Solutions (Spain)

Electrically Assisted Reverse Osmosis for Enhancing Boron Removal in One-Pass SWRO Desalination

Qianhong She. Nanyang Technological University (Singapore)

Enhanced Operation of Capacitive Deionization Using a Novel Biochar Integrated Flow-Electrode (Virtual)

Jihun Lim. Korea University (Korea Rep.)

▶ **Session 2.6 – Resource Recovery from Brine**

20 April 2022 (Wednesday)

1100 – 1230 hours

Room 2, Level 3

Session Co-Chairs: Nicolay Voutchkov, Water Globe Consultants (United States), Christos Charisiadis, Lenntech Water Treatment Solutions (Netherlands)

▶ **Brine Concentration and Mining - The Path Forward**

Nicolay Voutchkov. Water Globe Consultants (United States)

8 Months of Successful Pilot Operation for Highly Purified and Concentrated NaCl Brine Production

Seungwon Ihm. Saline Water Conversion Corporation (Saudi Arabia)

Lithium Extraction from Hypersaline Brine with Nanofiltration

ZiHao Foo. Massachusetts Institute of Technology (United States)

Zero-Liquid Discharge Made Affordable with Minimal Liquid Discharge Technology and a Circular Economy Mindset

Lewis Liu. Dupont Water Solutions (Singapore)

Theme 2: Delivering Water from Source to Tap – Treatment

▶ **Session 2.7 – Digitalization of Water Treatment Plants**

20 April 2022 (Wednesday)

1330 – 1500 hours

Room 2, Level 3

Session Co-Chairs: Bram Martijn, PWNT (Netherlands), Wim Audernaert, AM-Team (Belgium)

▶ **Water Digitalisation and Lessons Learned from Experiences of Automation Pioneers**

Dragan Savic. KWR Water Research Institute (Netherlands)

PUB's Experiences in Application of AR & MR Technologies For Training in Water Facilities

Desmond Tan. PUB, Singapore's National Water Agency (Singapore)

Real-Time Digital Twin Based Process Monitoring of Drinking Water Treatment Plants (Virtual)

Abel Heinsbroek. Vitens NV (Netherlands)

Advancing Digital Design to Digital Twin

James Leverton. AECOM (United Kingdom)

▶ **Session 2.8 – Augmenting Water Supply by Water Reuse**

20 April 2022 (Wednesday)

1330 – 1500 hours

Room 1, Level 3

Session Co-Chairs: Puah Aik Num, PUB, Singapore's National Water Agency (Singapore), Ong Say Leong, National University of Singapore (Singapore)

▶ **Potable Reuse – A Secure and Safe Water Supply Option**

Ian Law. IBL Solutions (Australia)

Joint Desalination and Reuse – A New Trend Towards Integrated Water Management

Nikolay Voutchkov. Saline Water Conversion Corporation (Saudi Arabia)

Potable Reuse from A Water/Wastewater Plant Operator's Perspective

Vijay Sundaram. AECOM (United States)

Wastewater Recycling in Singapore by EDR (Virtual)

Neil Moe. Suez Water Technologies & Solutions (United States)

Theme 3: Effective and Efficient Wastewater Management – Treatment & Conveyance

▶ **Session 3.1 – Membrane Technologies for Reuse**

19 April 2022 (Tuesday)

0900 – 1030 hours

Room 3, Level 3

Session Co-Chairs: Sandeep Sathyamoorthy, Black & Veatch (United States), Liu Yu, National University of Singapore (Singapore)

▶ **Best Management Practice for Wastewater Reuse**

Yountae Seo. SUEZ WTS (Singapore)

Ceramic Membrane Filtration Flux Enhancement by Ozonation and Coagulation Pre-treatment for WWTP Effluent Reuse

Martin Spruijt. PWNT (Netherlands)

Validation of High Recovery Water Treatment for Non Potable Reuse using an Integration of Ion Exchange and Reverse Osmosis

Iswaran Sivan. Clean TeQ Water (Australia)

Implementing Desaltec SOAR CCRO to Increase Efficiency and Reliability in Wastewater Reuse

Santhosh Ramalingam. Dupont (Singapore)

▶ **Session 3.2 – Membrane Bioreactor (MBR)**

19 April 2022 (Tuesday)

1100 – 1230 hours

Room 3, Level 3

Session Co-Chairs: Andrew Shaw, Black & Veatch (United States), Koh Sock Hoon, Binnies (Singapore)

▶ **A Practitioner's Perspective on the Design of Large Membrane Bioreactor Facilities**

Tim Constantine. Jacobs (Canada)

Comparison of Removal Performance of SARS-Cov-2 in Wastewater by Membrane Bioreactor and Conventional Activated Sludge Processes (Virtual)

Rong Xuan Wang. Kanazawa University (Japan)

Optimisation of Membrane Bioreactor Air Scouring: Effect Air Scouring on MBR Long Term Hydraulic Performance (Virtual)

Kaushalya Wijekoon. Dupont Water Solutions Windsor Nsw (Australia)

Long-Term Operation of Pilot NF-MBR System for High Recovery in Water Reclamation

Tzyy Haur Chong. Nanyang Technological University (Singapore)

Theme 3: Effective and Efficient Wastewater Management – Treatment & Conveyance

▶ Session 3.3 – Membrane Aerated Biofilm Reactor (MABR)

19 April 2022 (Tuesday)

1400 – 1530 hours

Room 3, Level 3

Session Co-Chairs: Andrew Shaw, Black & Veatch (United States), Ng Wun Jern, Nanyang Technological University (Singapore)

▶ Overview On Membrane Aerated Biofilm Reactor (MABR) (Virtual)

Robert Nerenberg. University of Notre Dame (United States)

▶ Three Years Of MABR Operation At The Ejby Mølle WRRF

Nerea Uri Carreno. VCS Denmark (Denmark)

▶ High-Rate Ammonia Removal Using A Full-Scale Spirally Wound MABR (Virtual)

Lotan Dagai. Fluence (Israel)

▶ Accelerated Startup Of PN/A Biofilm In Zeenamox™ Without Anammox Inoculation

Han Zhuang. Suez Water Technologies & Solutions (Singapore)

▶ Session 3.4 – Advances In Anaerobic Digestion (I)

19 April 2022 (Tuesday)

1600 – 1730 hours

Room 3, Level 3

Session Co-Chairs: Katrik Chandran, Columbia University (United States), Tao Guihe, PUB, Singapore's National Water Agency (Singapore)

▶ From Digestion To Ultra-Digestion: A Screening Of All The Possibilities To Reach The Limits Of Sludge Carbon Conversion To Biogas

Matthieu Haddad. Suez (France)

▶ Predictive Management Of Codigestion Using A Novel Bioelectrochemical Sensor

Sandeep Sathyamoorthy. Black And Veatch (United States)

▶ Effect Of Stepwise Reduction Of Solids Retention Time On The Microbial Community And Functional Pathways In Mesophilic Anaerobic Digestion Of Sludge

Angel Anika Cokro. Singapore Center For Life Sciences Engineering (Singapore)

▶ Modelling Of Co-Digestion (Virtual)

Damien Batstone. University of Queensland (Australia)

Theme 3: Effective and Efficient Wastewater Management – Treatment & Conveyance

▶ Session 3.5 – Advances In Anaerobic Digestion (II)

20 April 2022 (Wednesday)

0900 – 1030 hours

Room 3, Level 3

Session Co-Chairs: Nerea Uri Carreno, VCS Denmark (Denmark), Hong Pei Ying, KAUST (Saudi Arabia)

▶ Synergistic Enhancement of Recalcitrant Organic Degradation by *P. Chrysosporium* and Fenton Reaction as a Pretreatment for Biogas Generation

Julian Van Der Made. Columbia University (United States)

Advanced Anaerobic Digestion with Thermal Hydrolysis Process in Xiaohongmen Water Reclamation Plant – Experience from Planning to Execution

Julien Chauzy. Cambi As (France)

Mitigation of Inhibitory Effect of THP-AD Centrate on Partial Nitrification and Anammox: Insights into Ozone Pretreatment

Yan Zhou. Nanyang Technological University (Singapore)

Beyond Heat Exchangers: A Novel Approach to Cooling and Heat Recovery

Mathieu Haddad. Suez Treatment Infrastructure (France)

▶ Session 3.6 – Advances in Nutrient Removal

20 April 2022 (Wednesday)

1100 – 1230 hours

Room 3, Level 3

Session Co-Chairs: Ong Say Leong, National University of Singapore (Singapore), Yan Zhou, Nanyang Technological University (Singapore)

▶ Overview on Shortcut Nitrogen Pathways

Kartik Chandran. Columbia University (United States)

Microbial Advanced Oxidation – Intensifying SND Using H₂O₂ as Oxidating Agent

Liron Friedman. Columbia University (United States)

Phosphorus Footprinting

Andrew Shaw. Black & Veatch (United States)

Full Scale Optimization of a Side Stream Enhanced Biological Phosphorus Removal System

Keith Sears. Aecom (United States) (Virtual)

Enhanced Biological Phosphorus Removal

Guihe Tao. PUB, Singapore's National Water Agency (Singapore)

Theme 3: Effective and Efficient Wastewater Management – Treatment & Conveyance

▶ **Session 3.7 – Resource Recovery**

20 April 2022 (Wednesday)

1330 – 1500 hours

Room 3, Level 3

Session Co-Chairs: Kartik Chandran, Columbia University (United States) Jason Ren, Princeton University (United States)

▶ **Electroreforming of Waste Activated Sludge with Green Hydrogen Generation**

Hu Zhao. Nanyang Technological University (Singapore)

Energy and Carbon Offsetting Through Ammonium Recovery: An Essential Step Towards Carbon Neutral Municipal Wastewater Reclamation

Xiaoyuan Zhang. Nanyang Technological University (Singapore)

Sterling Natural Resource Center: Making Every Source a Resource

John Mura. East Valley Water District (United States)

Advanced Organic Recovery from Municipal Wastewater with an Enhanced Magnetic Separation (EMS) System: Pilot-Scale Verification (Virtual)

Conghui He. Tsinghua University (China)

▶ **Session 3.8 – Overflows, Tunneling and Climate Change**

19 April 2022 (Tuesday)

1100 – 1230 hours

Room 4, Level 3

Session Co-Chairs: Yi Yng Jee, Aecom (Singapore), Rajiv Ranjan Mishra, c-Ganga (India)

▶ **Overflows and impact of climate change**

Adam Hosking. Jacobs (United States)

Case Study on DTSS and Smart Sewer

Veradej Phipatanasuphorn. DHI (Singapore)

Kin Wee Wong. PUB, Singapore's National Water Agency (Singapore)

Case study on Tideway (Virtual)

Richard Lewis. Tideway (United Kingdom)

Case study on Cincinnati (Virtual)

Reese Johnson. MSDGC (United States)

Theme 3: Effective and Efficient Wastewater Management – Treatment & Conveyance

▶ **Session 3.9 – Corrosion In Conveyance Systems**

19 April 2022 (Tuesday)

1400 – 1530 hours

Room 4, Level 3

Session Co-Chairs: Richard Lewis, Tideway (United Kingdom), Marlene Choo-kun, Xylem (France)

▶ **Understanding Conversion and Its Impact on Calcium Aluminate Cement Mortar Durability in Sewer Environment (Virtual)**

Marjorie Valix. School of Chemical and Biomolecular Engineering, The University of Sydney (Australia)

H2S Corrosion Protection of Wastewater Concrete Assets: Technical Performance and Environmental Benefits of a Thin Calcium Aluminate Mineral Solution

Francois Saucier. Imerys (France)

Evaluation of Adhesion of Cement Based Protective Mortars Overlaid on Corroded Concrete Host (Virtual)

Ye Jun In. The University of Sydney (Australia)

Sewer Biofilms and their Link to Corrosion (Virtual)

Hans Curt-Flemming. University of Duisburg-Essen (Germany)

▶ **Session 3.10 – Non-Municipal Wastewater Reuse**

19 April 2022 (Tuesday)

1600 – 1730 hours

Room 4, Level 3

Session Co-Chairs: Nupur Bahadur, TERI (India), Liang Ying Ee National University of Singapore (Singapore)

▶ **Advanced Treatment at the WWTP Wervershoof (NL): Pilot- and Demonstration-scale Testing Combined with Digital Twins for Real-time Prediction of Key Variables, Including Micropollutants**

Wim Audenaert. AM-TEAM (Belgium)

Wastewater Reuse for Agriculture – Smart Control Concepts (Virtual)

Achim Ried. Xylem Services Gmbh (Germany)

Total Water Reuse for Industrial Food Plant and Increased Output Due to Operational Excellence

Rodrigo Haro. Nijhuis Saur Industries (Netherlands)

Water Recovery (Waterkracht)

Pieter Loose. EkoPak Sustainable Water (Denmark)

Theme 3: Effective and Efficient Wastewater Management – Treatment & Conveyance

▶ Session 3.11 – Climate Change and Carbon Footprint Reduction

20 April 2022 (Wednesday)

1100 – 1230 hours

Room 4, Level 3

Session Co-Chairs: Kala Vairavamoorthy, IWA,(United Kingdom), How Yong Ng, National University of Singapore (Singapore)

▶ Pathways to Water Sector Decarbonisation, Carbon Capture and Utilisation

Jason Ren. Princeton University (United States)

Coping with Climate Change at a Wastewater Treatment Works.

Tony Koodie Binnies, (United Kingdom)

Advances in GHG Monitoring and Mitigation at the Ejby Mølle WRRF: Trace Gas Quantification, CH4 Capturing, and N2O Mitigation

Nerea Uri Carreno. VCS Denmark, (Denmark)

Precise and Energy Efficient Aeration Control – Reduction of Carbon Footprint and Cost Saving Using Load-Depending Process Control

Heiko Hermann. Binder GmbH, (Germany)

▶ Session 3.12 – Next Generation of Intelligent Plant

20 April 2022 (Wednesday)

1330 – 1500 hours

Room 4, Level 3

Session Co-Chairs: Mads Leth, VCS Denmark (Denmark), Kelvin Koh, PUB, Singapore's National Water Agency (Singapore)

▶ International Advanced Analytics Research Collaborative – Operating a Full Advanced Treatment Demonstration Project Using AI

Kevin Hardy. National Water Research Institute (United States)

Digital Twin For Advanced Process Control And Analytics At PUB IVP (Virtual)

Otto Icke. Royal HaskoningDHV (Netherlands)

Digital Twin Development Implementation, And Results For The Changi WRP, Singapore

Bruce Johnson. Jacobs (United States)

Digital Twin Of Water Resource Recovery Facilities – From Concept To Implementation

Jian Dong Liu. Dhi A/s (Denmark)

Theme 3: Effective and Efficient Wastewater Management – Treatment & Conveyance

▶ **Session 3.13 – Integrated Approach in Removing Emerging Contaminants**

20 April 2022 (Wednesday)

1330 – 1500 hours

Room 8, Level 3

Session Co-Chairs: He Jianzhong, National University of Singapore (Singapore), Jun Wei Goh, National University of Singapore (Singapore)

▶ **Integration Of TADOX® Technology for Enhancing Water Reuse and Augmenting Capacity of Stps – Case Study From India**

Nupur Bahadur. The Energy and Resources Institute TERI (India)

Integrated Approach for the Treatment of Pharmaceutical Industry Wastewater (Virtual)

Pankaj Patil. SUEZ Water Technologies & Solutions (India)

Removing Pharmaceutical Compounds at the Source and Centralised to Reuse Wastewater Effluent for Irrigation Purposes

Yue Mei He. Nijhuis Saur Industries (Netherlands)

Theme 4: Cities of the Future

▶ **Session 4.1 – Digital Technology for Remote Sensing and Real Time Control**

19 April 2022 (Tuesday)

0900 – 1030 hours

Room 5, Level 3

Session Co-Chairs: Tony Wong, Monash University, (Australia), Roni Deitz, Arcadis, (United States)

▶ **The Role of Digital Technology in Social Interventions and Urban Water Governance**

Samuel Loyson. Suez (France)

Future City Flow – Online Value-Based Decision Support for Optimized Real Time Forecast and Control of Sewerage Systems

Sten Lindberg. DHI Sverige AB (Sweden)

Real-Time Flood Forecasting System for Stormwater Management

Tatsuya Tobe. Nihon Suido Consultants Co., Ltd. (Singapore)

Delivering Smart Flood Management in Bangkok

Sharla McGavock, Fiona Barbour, Ismail Weiliang Osman. Mott Macdonald (Singapore)

CDM Smith – Digitalizing: Harnessing the Potential of Digital Transformation in Data-Driven Water Solutions

Ralf Bufler, Eklavya Popat, Ilja Prinz, Amy Corriveau. CDM Smith Europe GmbH (Germany)

▶ **Session 4.2 – Digital Twins For Water Quality Management**

19 April 2022 (Tuesday)

1100 – 1230 hours

Room 5, Level 3

Session Co-Chairs: Piet Dirke, Arcadis, (Netherlands), Robyn Gwee, Deltares, (Singapore)

▶ **Development of an Online Receiving Environment Digital Twin to Enhance Liveability Outcomes**

Kalyan Chakravarthy. DHI Water & Environment (New Zealand)

Spatial Analysis and Planning System to Determine The Impact of Urbanisation on Freshwater Quality

Kalyan Chakravarthy. DHI Water & Environment (New Zealand)

Digital Solutions, Empowered With Machine Learning Methods, To Optimize Water Quality Management In Singapore Catchments

Cui Chun. Suez (Singapore)

Chong Kuoxing. PUB, Singapore's National Water Agency (Singapore)

Smart Monitoring of Surface Water Quality Using Internet-Of-Things at Sembakkam Lake, Chennai (Virtual)

Nisha Priya Mani. The Nature Conservancy – India (India)

Theme 4: Cities of the Future

▶ Session 4.3 – City Water Resilience

19 April 2022 (Tuesday)

1400 – 1530 hours

Room 5, Level 3

Session Co-Chairs: Mark Fletcher, Arup (United Kingdom), Robyn Gwee, Deltares, (Singapore)

▶ Presentation from the Resilience Shift (Virtual)

Louise Ellis. The Resilience Shift (United Kingdom)

The Emergency Actions for Centurial Drought in Taiwan (Virtual)

Wen Wen Liao. Water Resources Agency, Ministry Of Economic Affairs (Taiwan)

Urban Floods and Human Health Impacts

Ira Wardani. Deltares / Radboud University (Netherlands)

Building a Climate Resilience Strategy for Lower Manhattan: Extending the Shoreline

Roni M Deitz. Arcadis (United States)

▶ Session 4.4 – Urban Adaptation Strategies

19 April 2022 (Tuesday)

1600 – 1730 hours

Room 5, Level 3

Session Co-Chairs: Piet Dircke, Arcadis, (Netherlands), Roni Deitz, Arcadis, (United States)

▶ An Australian Perspective on Urban Adaptation Strategies

Tony Wang. Monash University (Australia)

Developing Flood Resilience Investment Strategies Through Global Flood Risk Tool

Matthijs Bos. Royal Haskoningdhv (Netherlands)

Adapting to The Uncertain: A Different Climate Strategy

Fiona Barbour. Mott Macdonald (Singapore)

From City to Block: A Multi-Scale Analysis to Improve Outdoor Space

Mariana Pereira Guimaraes. Politecnico Di Milano (Netherlands)

Theme 4: Cities of the Future

▶ **Session 4.5 – Water Master-Planning for Cities**

20 April 2022 (Wednesday)

0900 – 1030 hours

Room 5, Level 3

Session Co-Chairs: Mark Fletcher, ARUP, (United Kingdom), Robyn Gwee, Deltares, (Singapore)

▶ **Citywide Inclusive Sanitation (CWIS)**

Christian Walder. Asian Development Bank (Philippines)

Water in Circular Economy and Resilience (WICER) Framework

Diego J. Rodriguez. World Bank (Netherlands)

The Integration of Infrastructure Hardening and Equitable Transformational Resilience Strategies in the New York City Region Post Sandy and Post Ida

Edgar Westerhof, Alan Blumberg. Arcadis (United States)

Adapting Rotterdam to Extreme Weather

Johan Verlinde, City of Rotterdam (the Netherlands)

▶ **Session 4.6 – Economic Valuation Of Hybrid Infrastructure**

20 April 2022 (Wednesday)

1100 – 1230 hours

Room 5, Level 3

Session Co-Chairs: Tony Wong, Monash University, (Australia), Roni Deitz, Arcadis, (United States)

▶ **World Bank Economic Valuation Model (Virtual)**

Marcus Wishart. World Bank (China)

Valuing The Invaluable – A Framework For Valuing The Economic, Social & Environmental Benefits Of Blue, Green & Grey Infrastructure (Virtual)

Alexandra Cifuentes. Frontier Economics (Australia)

Evidencing The Benefit-Cost Value Of Blue-Green Infrastructure Retrofit Across London To Catalyse Greater Investment In Sustainable Drainage

Simon Ainley. Arcadis Consulting (UK) Ltd (United Kingdom)

Plan For Liveability And The Unexpected: A Socio-Economic Approach To Account For Stakeholder Priorities And Future Uncertainty

Julie Skrydstrup. Ramboll A/s (Denmark)

Theme 4: Cities of the Future

▶ **Session 4.7 – Flood Resilience for Cities of the Future**

20 April 2022 (Wednesday)

1330 – 1500 hours

Room 5, Level 3

Session Co-Chairs: Stephanie Groen, Aurecon, (Singapore), Roni Deitz, Arcadis, (United States)

▶ **Lessons Learned from The European Floods in July 2021: Climate Adaptation Measures and Emergency Response in Cities Along the Meuse River**

Piet Dircke. Arcadis (Netherlands)

The Next Wave of Risk Reduction: Fostering Urban Flood Resilience in Rapidly Urbanizing Mid-Tier Cities

Travis Bunt. One Architecture (United States)

Flood Resilience for Cities of the Future – The Hong Kong Experience (Virtual)

Sueann Sheung Yan Lee. Government of Hong Kong Special Administrative Region of The People's Republic of China (Hong Kong SAR)

Integrated Flood Resilience Strategy for Yangon, Myanmar

Tjitte Nauta. Deltares (Netherlands)

Theme 5: Water Quality & Health

▶ **Session 5.1 – Water Quality Assessment and Management for Health Across the Full Water Spectrum: Treatment and Management**

19 April 2022 (Tuesday)
0900 – 1030 hours
Room 7, Level 3

Session Co-Chairs: Ruchika Shiva, IRC WASH (India), Daisuke Sano, Tohoku University (Japan)

▶ **Reuse Of Municipal Reclaimed Water and Treated Greywater: Implications for Crop Irrigation and Human Health**

Silvia Monteiro. Universidade Lisboa, Tecnico Lisbon (Portugal)

Short-Term Assessment of Chlorine Losses in Water Distribution Networks With Downstream Tanks (Virtual)

Adichai Pornprommin, Natchapol Charuwimolkul. Faculty Of Engineering, Kasetsart University (Thailand)

Effect of Intermittent and Continuous Flow Regimes on The Microbial Water Quality and Microbiomes in a Pilot-Scale Drinking Water Test Bed

Mats Leifels, Dan Cheng, Sophia Wu, Nasha Nadhirah, Jiawei Cai, Eric Hill, Nico Boon, Jorien Favere, Stefan Wuertz, Andrew Whittle. Nanyang Technological University (Singapore)

Effect of Swabbing Cleaning Method on Biofilm Communities of a Drinking Water Distribution System in Madrid (Virtual)

Carolina Calero Preciado, Manuel José Arias Guedón. Canal De Isabel Ii (Spain)

▶ **Session 5.2 – Water Quality Assessment and Management for Health Across the Full Water Spectrum: Real-Time Sensors and Standards**

19 April 2022 (Tuesday)
1100 – 1230 hours
Room 7, Level 3

Session Co-Chairs: Annalisa Contos, Atom Consulting (Australia), Robert Bos, IWA (Switzerland)

▶ **Development of Rapid Detection Methods to Enumerate Bacteria in Water Systems**

Peiyong Hong. King Abdullah University of Science And Technology (Saudi Arabia)

Method Development and Analysis of Disinfectants in a University Campus During Covid19 Pandemic

Sanjeeb Mohapatra. National University of Singapore (Singapore)

Quick and Easy Characterization of Microplastics in Surface Water and Treated Effluent

Danence Lee. PUB, Singapore's National Water Agency (Singapore)

Colorectal Cancer and Nitrates: Implications for Health and The Economy

Daniel Deere. Water Futures Pty Ltd (Australia)
Marion Savill. Affordable Water (New Zealand)

Theme 5: Water Quality & Health

▶ **Session 5.3 – Wastewater-Based Epidemiology (I)**

19 April 2022 (Tuesday)

1400 – 1530 hours

Room 7, Level 3

Session Co-Chairs: Karina Gin, National University of Singapore (Singapore), Regina Sommer, Medical University of Vienna (Australia)

▶ **WSPHERE: Global Data Network on Sewage Surveillance as Public Health Tool (Virtual)**

Gertjan Medema. KWR Water (Netherlands)

A Wastewater-Based Epidemiology Tool for COVID-19 Surveillance In Portugal

Silvia Monterio. Universidade Lisboa, Tecnico Lisbon (Portugal)

Developing A Global Wastewater Epidemiology Service That Delivers Public Health Benefits and Manages Current and Future Outbreaks (Virtual)

Olivia Bailey. Ove Arup & Partners (United Kingdom)

High Level Guidance Document of Sewage Surveillance Research of COVID-19

Daniel Deere. Water Futures Pty Ltd (Australia)

▶ **Session 5.4 – Wastewater-Based Epidemiology (II)**

19 April 2022 (Wednesday)

1600 – 1730 hours

Room 7, Level 3

Session Co-Chairs: Peter Grevatt, The Water Research Foundation (United States), David Cunliffe, SA Health (Australia)

▶ **The Role of Drainage Air Leaks in Transmission of COVID-19 in High-Rise Housing (Virtual)**

Kenneth Leung. Hong Kong SAR (Hong Kong SAR)

Understanding COVID-19 Spread in A College Community Via Wastewater Based Epidemiology

Nishita D'Souza. Michigan State (United States)

Combating COVID-19 With a Systematic Sewage Surveillance Strategy for Megacities: A Successful Large-Scale Implementation in Hong Kong (Virtual)

Tong Zhang. The University of Hong Kong (Hong Kong SAR)

Panel Discussion

Joan Rose. Michigan State (United States) - Moderator

Gertjan Medema. KWR Watercycle (Netherlands)

Shane Snyder. National Technological University (Singapore)

Kate Medlicott, World Health Organisation (Singapore)

Theme 5: Water Quality & Health

▶ **Session 5.5 – Water Quality Assessment and Management for Health Across The Full Water Spectrum: Risk Assessment**

20 April 2022 (Tuesday)

0900 – 1030 hours

Room 7, Level 3

Session Co-Chairs: Joan Rose, Michigan State University (United States), Fiona Waller, Affinity Water (United Kingdom)

▶ **Overall Developments On Legionella**

Ana Maria de Roda Husman. RIVM (Netherlands)

Regularized Regression Modeling Of Rotavirus Disinfection In Wastewater For Predictive Environmental Microbiology In Sanitation Safety Planning (Virtual)

Daisuke Sano. Tohoku University (Japan)

Resistance Of Mycobacterium In Water Treatment Processes

Ricardo Santos. Instituto Superior (Portugal)

Measuring Impact Of Systematic Risk Assessment And Risk Management Of Piped Water Supplies

Alauddin Ahemd. ITN-BUET (Bangladesh)

▶ **Session 5.6 – Systems Approaches to Service Delivery**

20 April 2022 (Wednesday)

1100 – 1230 hours

Room 7, Level 3

Session Co-Chairs: Darryl Day, The Peter Cullen Water and Environment Trust (Australia), Jennifer de France, WHO (Switzerland)

▶ **ADB's Policies And Programmes To Promote Sustainable And Resilient WASH In The Asia Pacific Region**

Neeta Pokhrel. Asian Development Bank (Manila)

Utility-Managed Rural Water Services: Models, Pathways, Performance And Enabling Environment (Virtual)

Marieke Adank. IRC (Netherlands)

Urban Utilities Don't Operate In A Vacuum: Assessment And Strengthening Of The Enabling Environment

Patrick Moriarty. IRC (Netherlands)

Urban Utilities And The Need To Raise Additional Finance: The Role Of National Public Development Banks

Ingeborg Krukkert. IRC (Netherlands)

WHO Study On Sanitation And Wastewater Regulations (Virtual)

Kate Medicott. World Health Organisation (Switzerland)

Theme 5: Water Quality & Health

▶ **Session 5.7 – Water Quality/Food Safety Nexus: From Safely Managed Drinking Water Through WSP to HACCP for Food Safety (Organised With FAO)**

20 April 2022 (Wednesday)

1330 – 1500 hours

Room 7, Level 3

Session Co-Chairs: Sasha Koo-Oshima, FAO (Italy), Kalanithy Vairavamoorthy, International Water Association (United Kingdom)

▶ **Stage setting presentation: Metagenomics, agricultural water quality and food safety**

Joan Rose. Michigan State University (United States)

Water Quality and Food Safety: perspectives of the USFDA (Virtual)

Eric Stevens. USFDA (United States)

Genomics methods for identifying, tracking and tracing pathogens in irrigation water (Virtual)

Maasaki Kitajima. Hokkaido University (Japan)

Panel Discussion Moderated by:

Peter Grevatt. The Water Research Foundation (United States)

Robert Bos. International Water Association (Switzerland)

Theme 6: Nexus & Circularity

▶ Session 6.1 – Policy And Planning (I)

19 April 2022 (Tuesday)

0900 – 1030 hours

Room 8, Level 3

Session Co-Chairs: Dragan Savic, KWR Water Research Institute (Netherlands), Neo Wen Yang, Sobono Greenland (Singapore)

▶ The Water-Energy-Food Nexus for Policy Relevance (Virtual)

Janez Susnik. IHE Delft Institute for Water Education (United States)

Circular Water 2050 For Future Proof Cities - Impact And Opportunities For The Urban Water Cycle Of The 'Fully Circular In 2050' Target Of The Netherlands In A Changing World (Virtual)

Kees Roest. KWR Water (Netherlands)

The Davao City Bulk Water Supply Project “Water – Energy Nexus”

Libert Lomuntad. Apo Agua Infraestructura, Inc. (Philippines)

▶ Session 6.2 – Policy and Planning (II)

19 April 2022 (Tuesday)

1100 – 1230 hours

Room 8, Level 3

Session Co-Chairs: Pang Chee Meng, PUB, Singapore's National Water Agency (Singapore), Gary Amy, Clemson University (United States)

▶ Approach To Sustainability In PUB, Singapore's National Water Agency

Mien Ling Chong. PUB, Singapore's National Water Agency (Singapore)

Digitalisation For Low-Carbon Thinking In New Zealand (Virtual)

Jonny Breen. Mott Macdonald (Singapore)

Impact Of Floating Solar Panels On Drinking Water Reservoir Water Quality

Bram Martjin. PWNT (Netherlands)

An Operational Framework to Quantify the Sustainability of Water Resource Recovery Facilities

Maria Faragó. Technical University of Denmark - DTU Environment – Water Technology & Processes (Denmark)

Theme 6: Nexus & Circularity

▶ **Session 6.3 – Stakeholder Engagement And Cross-Sectoral Collaboration In The Circular Water Economy**

19 April 2022 (Tuesday)

1400 – 1530 hours

Room 8, Level 3

Session Co-Chairs: Greg Ryan, WSAA (Australia), Chong Mien Ling, PUB, Singapore's National Water Agency (Singapore)

▶ **Stakeholder Engagement In The Circular Water Economy**

Jos Frijns. KWR Water Research Institute (Netherlands)

Linking Stakeholder Engagement To Capital Planning And Decision Making (Virtual)

Boudewijn Neijens. Copperleaf (Canada)

Community-Led Approach To Collect National Sanitation Infrastructure Data In The United States

Brandon Hunter. Columbia University (United States)

Reaping The Benefits Of Public-Private Partnerships To Attain Circularity In Wastewater: A Case Of Two Indian Cities

Avinandan Taron. International Water Management Institute (Sri Lanka)

▶ **Session 6.4 – System of Systems for Circular Economy**

19 April 2022 (Tuesday)

1600 – 1730 hours

Room 8, Level 3

Session Co-Chairs: Inga Jacobs-Mata, International Water Management Institute (South Africa), Janez Susnik, IHE Delft Institute for Water Education (Netherlands)

▶ **NEOM: A New Future For Water Awaits**

Gavin Van Tonder, NEOM Water (Saudi Arabia)

Advanced Anaerobic Digestion Helps Achieve Asset Optimization, Sustainable & Circular Economy For Effective Biosolids Management

Ashish Sahu, Julien Chauzy. Cambi As (France)

Water-Energy-Environment Nexus Modelling For Optimizing Water Loss Control Strategy And Interventions

Seo Hyung Choi. Unesco I-wssm (Korea Rep)

Theme 6: Nexus & Circularity

▶ Session 6.5 – Resource Circularity

20 April 2022 (Wednesday)

0900 – 1030 hours

Room 8, Level 3

Session Co-Chairs: Gary Gu, DuPont Water Solutions (United States), Vethathirri Ramanujam Srinivasan, Nanyang Technological University (Singapore)

▶ Wastewater “Refining” Utilizing Minimal Liquid Discharge

Tina Arrowood. DuPont Water (United States)

A New Paradigm For The Mining Industry: Recovery Of Valuable Metals From Saline Aqueous Sources

Gary Amy. Clemson University (United States)

Beyond Value Creation: (Financial) Impact with Resource Recovery (Virtual)

Martijn Olde Weghuis. Vitens (Netherlands)

Towards Zero Waste Through Co-Gasification Of Sludge And Municipal Solid Waste And Generation Of Waste-Derived Slag As Newsand

Grzegorz Lisak. Nanyang Technological University (Singapore)

▶ Session 6.6 – Carbon Circularity

20 April 2022 (Wednesday)

1100 – 1230 hours

Room 8, Level 3

Session Co-Chairs: Tao Li, IWA (China), Tina Arrowood, DuPont Water Solutions (United States)

▶ Hydrogen Circular Economy: Viability, Scalability, And Risk for Water Industry

Arash Zamyadi. Water Research Australia (Australia)

Smart Thermal Grid with the integration of Aquifer Thermal Energy Storage and Surface Water to decarbonize the buildings heating and cooling systems, Floriade 2022 case study, Netherlands

Tijmen Salet. Witteveen+Bos N.V. (The Netherlands)

Techno-Economic Analysis of Electrochemical CO2 Reduction for Biogas Upgrading to Ethanol or Pure Methane.

Huan Jiang. National University of Singapore (Singapore)

Climate Mitigation in The Water-Cycle: The Greenhouse Gas Abatement Selection Procedure

Thomas De Groot. Arcadis (Netherlands)

LIST OF POSTER PRESENTERS

Theme 1: Delivering Water from Source to Tap – Network

- ▶ **Anti-Seismic Measures of Water Supply Utility in Taipei City**
Yung Ming Wang. Taipei City Government (Taiwan)
- ▶ **Water Pipes' Corrosion Inspection in Xinbeitou Hot Spring Area**
Yung Ming Wang. Taipei City Government (Taiwan)
- ▶ **TWINET Deployment in Milano Water Network**
Hernani Theias, François Figueres, Andrea Rossi, Olivier Knapen. Suez (France)
- ▶ **Reducing Water Loss from Early Leak Detection on Large Diameter Pipelines**
Naama Zeldis, Oded Fruchtmán, Yan Ming, Waseem Akram, Harry Low. Aquarius-Spectrum (Israel)
- ▶ **Memosens 2.0 – Simple, Safe and Connected the Next Evolution of Liquid Analysis Sensor Digitalization**
Caroline Wan, Oliver Durm. Endress+hauser (s.e.a.) Pte. Ltd (Singapore)
- ▶ **World's First, Full Bore Zero Inlet/Outlet DN Electromagnetic Flowmeter Independent of Flow Profile**
Emmy Lim. Endress+hauser (s.e.a.) Pte. Ltd (Singapore)
- ▶ **Heartbeat Technology – State-Of-The Art Flowmeter Verification for The Water and Wastewater Industry**
Kia Chai Ng. Endress+hauser (s.e.a.) Pte. Ltd (Singapore)
- ▶ **OPTI REVENUE: From Apparent “Commercial” Losses Identification, Quantification and Decrease Strategy to Improved Revenue Management**
Hernani Theias, Alexandre Gil, François Figueres, F Timoner, Asier Arrizabalaga. Suez (France)
- ▶ **Using Machine Learning and Absorbance-Transmittance and Excitation-Emission Matrix (A-TEEM) Spectroscopy for Water Soluble Fraction (WSF) Contaminant Early Warning Detection in Source Water**
Linxi Chen, Adam Gilmore, Joseph Mockus, Adam Eyring. Horiba Scientific (United States)
- ▶ **Use Of Spatial Failure Clustering Analysis to Target Deployment of Noise Loggers**
Milna Mandusic. Municipality Of Oslo – The water and sewerage department (Norway)
- ▶ **AI Application for Dam Safety Monitoring**
Jordi Cros. Adasa (Spain)
- ▶ **Model Based Exploration of Optimal Asset Management Strategies to Minimize Leakages in Water Distribution Networks**
Harsha Abeykoon, Assela Pathirana. National Water Supply and Drainage Board (Sri Lanka)
- ▶ **New Pipe Design Methodology for Pressure Loss Reduction of Pipe Elements and Pipe Networks**
Gábor Gönczi. Budapest Waterworks (Hungary)
- ▶ **Applications of Real-time Hydraulic Modelling for Smart Water Management**
Liang Yu, Zhongqing Wei, Heng Yin, Yang Qu, Xinyu He. Shanghai Huishui Technology, Co.,Ltd (China)
- ▶ **IIOT Thermodynamic Pump Condition Monitoring System for Maintenance & Performance Management**
Steve Barrett. Riventa (United Kingdom)

LIST OF POSTER PRESENTERS

Theme 2: Delivering Water from Source to Tap – Treatment

- ▶ **Investigation Of Surfactant–Membrane Interaction Using Molecular Dynamics Simulation with Umbrella Sampling**
Yunqiao Ma, Sadiye Velioglu, Thien And Trinh, Rong Wang, Jia Wei Chew. Nanyang Technological University (Singapore)
- ▶ **Unravelling The Role of Support Membrane Chemistry and Pore Properties on The Formation of Thin-Film Composite Polyamide Membranes**
Yu Jie Lim. Nanyang Technological University (Singapore)
- ▶ **Predicting Reverse Osmosis Membrane Cleaning Times Using Machine Learning**
Mike Dixon, Nick Herold, Katie Higgins, Joelyn Tan, Xiao Qiang King. Synauta Inc. (Canada)
- ▶ **Using Co2 for Acidification and Process Improvement in A Seawater Ro Plant**
Ratul Das, Thomas Altmann, Shinsuke Hirata, Nobuyuki Masumoto. ACWA Power (Saudi Arabia)
- ▶ **Enhancing Municipal Desalination Performance**
Javier Suarez, Santhosh Ramalingam. Dupont (Singapore)
- ▶ **3D-Printing of Anti-Fouling Nanocellulose Desalination Membrane**
Liang Ying Ee. National University of Singapore (Singapore)
- ▶ **On-Line Tool for Ultrafiltration and Reverse Osmosis Systems Normalization and Optimization**
Javier Suarez. Dupont (Singapore)
- ▶ **Dechlorination Control in Reverse Osmosis Membrane Applications**
Vadim Malkov. Hach (United States)
- ▶ **Analysis And Prediction of Ultrafiltration Membrane Fouling Resistance in Water Treatment Using Artificial Intelligence**
Mahdi Faramarzi, Kaushik Ghosh, Gokula Krishnan Sivaprakasam, Matsui Yasuhiro. Yokogawa Engineering Asia Pte. Ltd. (Singapore)
- ▶ **Sustainable Urban Water Management – A Triumph on The Supply of Recycled Water in Hong Kong**
C.K. Lee, T.T. Lin, S. Shou, C. Chan, H. Lee, T.S. Yu. The Government of the Hong Kong Special Administrative Region (Hong Kong SAR)
- ▶ **First Stage of Tseung Kwan O Desalination Plant – Innovations and Features**
Ting Ting Lu, Jose Bidaurrezaga Ka Chun Yan, Andy Kwok. Water Supplies Department (Hong Kong SAR)
- ▶ **Breakthrough Dry-Tested Seawater Reverse Osmosis Elements**
Santhosh Ramalingam, Maria Angeles Perez Macia, Guillem Gilabert-Oriol, Lewis Liu. Dupont (Singapore)
- ▶ **Removals Of Methicillin-Resistant Staphylococcus Aureus and Its Methicillin-Resistant Meca Genes By LED-UV And LED-UV-Based Advanced Oxidation Processes**
YW Chen, S Ghosh, L Wang, Jiangyong Hu. National University of Singapore (Singapore)
- ▶ **The Beneficial Impacts of Ozonated Microfiltration on Water Quality and Ceramic Membrane Performance**
Holly Shorney-Darby, Jumeng Zheng. PWNT (Netherlands)
- ▶ **Reduction Of RO Membrane Cleaning Frequency by Inserting Ceramics Adsorption Filter Between Ultrafiltration and RO Systems**
Keiko Nakano, Hikaru Yoshimine, Tomonori Saeki, Kenichiro Sekiguchi, Masahiro Sato, Yusaku Maruno, Benghuat Low. Hitachi Metals Singapore Pte Ltd (Singapore)
- ▶ **Resource Recovery from The Greenhouse Water Cycle: Characterizing Selectivity Using Multicomponent Transport Models**
Danyal Rehman, John Lienhard. Massachusetts Institute of Technology (MIT) (United States)

LIST OF POSTER PRESENTERS

Theme 2: Delivering Water from Source to Tap – Treatment

- ▶ **Biological Treatment in Drinking Water? Treating Potable Water with Advanced Biofiltration to Reduce Disinfection By-products**
Stanley Shmia, Alex Bettinardi. De Nora Water Technologies (United States)
- ▶ **Planning Ahead for Smart Extension – Siu Ho Wan Water Treatment Works, Hong Kong**
Kin Lik Sy, Stephanus Shou, James Chan, Alex So. Water Supplies Department, The Government of The Hong Kong Special Administrative Region (Hong Kong SAR)
- ▶ **Optimizing Brine Electrolysis Processes to Minimize Chlorate Production**
Andrew Boal, Jean-Paul Monali. De Nora Water Technologies (United States)
- ▶ **Putatan Water Treatment Plant 2 – Delivering A New 150MLD Plant in Metro Manila to Work with One of The World's Most Challenge Water Sources**
Adrian Marsden. Arup (Philippines)
- ▶ **The Potential of Split-Feed Osmotically Assisted Reverse Osmosis (SF-OARO) For Low-Energy, Low Cost and High Recovery Desalination**
Zijing Mo, Christian Peters, Qianhong She, Cheng Long. School of Civil and Environmental Engineering, Nanyang Technological University (Singapore)
- ▶ **Prediction Of Algal Bloom in Reservoir Dams Using Sparse Modelling and Support Vector Machine**
Daisuke Sano, Shota Yashima, Hiroomi Imamoto, Yasuhiro Asada, Michihiro Akiba, Osamu Nishimura, Yohei Miura. Tohoku University (Japan)
- ▶ **Selecting The Right Solution for NOM Removal - An Approach, Considerations and Experiences in the UK.**
Tony Koodie, Stewart Sutherland, Nicholas Booker, Andrew Elphinston. Binnies (United Kingdom)
- ▶ **Removal Of Emerging Contaminants by Nature-Based Sorbent Materials in Advanced Constructed Wetlands – Application for Water Reuse**
Marieh Fatahizadeh, Marjolaine Deschamps, Chaza Chbib, Nicolas Roche Jerome Labille. Aix-Marseille University (France)
- ▶ **Improvements In Coagulation Control Using Integrated Deterministic Modelling and Machine Learning Approaches**
Chaim Kolominskas. Envirosuite (Australia)
- ▶ **Multi-Agency Reuse Programs: Lessons for Successful Collaboration**
Felicia Marcus, David Smith, Eric Rosenblum, Robert Raucher, Shannon Spurlock. Stanford University (USA)
- ▶ **Inline UV Disinfection System, A New Approach Of Equipment Design**
Gábor Gönczi, Ramón Kreka, János Farkas, István Lajtos. Budapest Waterworks (Hungary)
- ▶ **Ceramic Microfiltration Pretreatment; Shifting From Ionexchange To Coagulation At Wtp Andijk**
Jink Gude, Bram Martijn. PWNT (Netherlands)
- ▶ **Autonomous Water Production – Should We Really Take The Human Fully Out Of The Lop?**
Mark Kaney, Chris Steele. Binnies(United Kingdom)
- ▶ **Zero-Liquid Discharge Made Affordable with Minimal Liquid Discharge Technology and a Circular Economy Mind Set**
Lewis Liu. Dupont Water Solutions (Singapore)
- ▶ **Energy Recovery Device Deployed in a Ultra High Pressure Reverse Osmosis ZLD Application: A Case Study**
Satish Shaligram. Energy Recovery (Canada)

LIST OF POSTER PRESENTERS

Theme 3: Effective and Efficient Wastewater Management – Treatment & Conveyance

- ▶ **Wastewater Carbon Recovery Through Biopolymer Platforms: Conversion Of Polyhydroxybutyrate Monomers To Propylene Over Solid Acid Catalysts**
Moses Shijie Leow, Andrew J. Koehler, Lauren E. Cronmiller, Xiangchen Huo, Gabriella D. Lahti, Yalin Li, Glenn R. Hafenstine, Derek R. Vardon, Timothy J. Strathmann. Nanyang Technological University (Singapore)
- ▶ **Rapid Removal Of Refractory Organics From Old-Age Landfill Leachate With High-Valent Polynuclear Iron(III) Hydroxo Complex**
Kwok Wah Cheung, Kwok Pan Ho, Yan Xiang Cui, Ho Kwong Chui. Hong Kong Productivity Council (Hong Kong SAR)
- ▶ **Evaluation Of Scouring Efficiency By CFD Analysis For Membrane Filtration System With Flat-Sheet Ceramic Membrane**
Hiroshi Noguchi, Chakravarthy Gudipati, Terutake Niwa, Adil Dhalla. Meiden Singapore Pte Ltd (Singapore)
- ▶ **Translation And Evaluation Of Nature-Inspired Hydrophobic Membranes For Membrane Distillation**
Thong Zhi Wei. Nanyang Technological University – Ntuitive Pte Ltd (Singapore)
- ▶ **Novel Sandwich Structured Hollow Fiber Membrane for High Efficiency Membrane Distillation and Scale-Up for Pilot Validation**
Chakravarthy Gudipati, Junyou Zhang, Marn soon Qua, Aung Thet Paing, Chin Ann Chow, Karikalan Mottaiyan, Adil Dhalla. Nanyang Technological University – NTUitive Pte Ltd (START Center) (Singapore)
- ▶ **Monitoring Of Aeration Systems And Determination Of A-Factors With The Ex-Situ Steady-State Off-Gas Method: Sensitivity Analysis And A Novel Approach To Examine Non-Aerated Activated Sludge Tanks**
Maximilian Schwarz, Jana Trippel, Martin Wagner, Markus Engelhart. Technical University of Darmstadt, Institute IWAR (Germany)
- ▶ **Ozone And H₂O₂ In Wastewater Treatment Of A Bio-Refinery**
Cristian Carboni . De Nora Water Technologies (Italy)
- ▶ **In-Situ Adsorption & Electro-Regeneration Using 3d Gac Electrode System For Pharmaceutical Wastewater Treatment**
JW Goh, SCK Yong, ZJ Choo, W Wu, Z Huang, SL Ong, Jiangyong Hu. National University Of Singapore (Singapore)
- ▶ **Ceramics Adsorption Filter (CAF) for Water Recycle @ Precision Cleaning Factory**
Keiko Nakano, Chu Tee Tan, Hikaru Yoshimine, Tomonori Saeki. Hitachi Metals Singapore Pte Ltd (Singapore)
- ▶ **Fluorescence Characterization And Identification Of Dissolved Organic Matter In Wastewater Through HRLC-MS/MS**
Sanjeed Mohapatra. National University of Singapore (Singapore)
- ▶ **Leveraging Real-Time Analytical Instrumentation For Anaerobic Digester Health Monitoring During And After Successful Startup Of THP Pretreatment Process**
Steve Myers. Hach (United States)
- ▶ **Study For Seasonal Changes In Activated Sludge Dewaterability And Settleability: Insight From Qualified Image Analysis And Extracellular Polymeric Substances Measurement**
Yuki Nakaya. Hokkaido University (Japan)
- ▶ **Design And Commissioning Of A Large Scale MBR-RO For Newater Production**
Gerin James, Ming Wei Ho, Peter Zauner. Dupont Water Solutions (Australia)

LIST OF POSTER PRESENTERS

Theme 3: Effective and Efficient Wastewater Management – Treatment & Conveyance

- ▶ **Sustainable Solution For The Hard-To-Treat Industrial Wastewater**
Jianxiong Xu, Massimo Spina. Reacto Pte. Ltd. (Singapore)
- ▶ **Integrated Approach Of Wastewater Management For Inclusive And Efficient Service Delivery Mechanism**
Suraj Kumar, Bhushan Raj Shrestha, Karthik Ravichandran, Parth Goellsha Basyal. Citywide Inclusive Sanitation Technical Assistance Hub, South Asia (Nepal)
- ▶ **Comparison Of Corrosion Resistance Of One-Part Geopolymer And Calcium Aluminate Cement Mortar Exposed To Live Aggressive Sewer Environment**
Cherdphong Seedao, Marjorie Valix, Jerry Sunarho, Ye Jun In. Sembcorp Industries Ltd (Singapore)
- ▶ **ATP Analysis For Early Toxicity And Sludge Health Monitoring In Industrial Wastewater Treatment Systems**
Stanislaus Raditya Suwarno, Nan Li. Sembcorp Industries Ltd (Singapore)
- ▶ **Biological Nutrient Removal (BNR) Through Modified Conventional Treatment System**
Arthur II Villaflo. Manila Water Company, Inc (Phillipines)
- ▶ **Biological Nutrient Removal Compliance Through Wastewater Flow Diversion**
Eunice Canlas. Manila Water Company, Inc (Phillipines)
- ▶ **A New Generation Of Advanced Biological Sequenced Batch Reactor**
Mathieu Haddad, Marlene Choo-Kun, Françoise Petitpain perrin, Alexis Daunay, Deborah Delgado, Thibaut Saur. Suez (France)
- ▶ **Inflow Prognoses To A Large Wastewater Treatment Plant (WWTP) In Copenhagen Forecasted By Machine Learning (ML)**
Sten Lindberg. DHI (Denmark)
- ▶ **Utilizing Dissolved Air Flotation (DAF) As Pre-Treatment For Wastewater From Commercial Establishments In The Philippines**
Reymaliza Santiago, Emmanuel Pineda. Manila Water Technical Ventures (Phillipines)
- ▶ **Piloting Results Of A Novel Ion Exchange And Encapsulated Bacteria System For Complete Nitrate Removal**
Sivan Iswaran, Gerrit Boersma, Jonathan Wright, William Mclean. Clean TeQ Water (Australia)
- ▶ **A Genome-Centric Metagenomics Approach To Explain Microbial Community Structure In Anaerobic Digesters**
Soheil A. Neshat, Krithika Arumugam, Uma Shankari, Prabu Sekar, Rikky Purbojati, TQN Nguyen, Angel Anika Cokro, Ezequiel. Nanyang Technological University (Singapore)
- ▶ **New Method For Quick Biosolids Dewaterability Assessment, Polymer Selection And Process Improvement**
Jean-Francois Mischler, Claire Courbet. Bucher Unipektin Ag (Switzerland)
- ▶ **Preliminary Engineering, Design And Implementation Of Improvements To The MMSD Head Tanks**
James Cooper. Arcadis (United States)
- ▶ **Effect of dosing iron-containing sludge from waterworks on treatment performance and membrane fouling of a pilot-scale integrated membrane bioreactor system**
Shujuan Huang. National University of Singapore (Singapore)

LIST OF POSTER PRESENTERS

Theme 4: Cities of the Future

- ▶ **Water Tariffs And Affordability In Urban Water Supply And Wastewater Systems**
Stefanos Xenarios, Eduardo Araral, Joost Buurman. Institute Of Water Policy, Lkyspp, NUS (Singapore)
- ▶ **A New Chapter Of Our Multi-Functional Drainage Infrastructure: Drainage Improvement Works In Mong Kok**
Pui Shan Yuen, Ming Yueng Kwan. Drainage Services Department (Hong Kong SAR)
- ▶ **Depth-Integrated Wave-Current Models**
Zhengtong Yang, Philip L-F Liu. Technology Centre For Offshore And Marine, Singapore (TCOMS) (Singapore)
- ▶ **Novel Clogging Resistant Permeable Pavements**
Alalea Kia, Hong Wong, Chris Cheeseman, David Balmforth. Imperial College London (United Kingdom)
- ▶ **A Regional Swell Prediction Model Based On Convolutional Neural Network**
Tao Ai Feng, Wang Rong. China Harbour (s) Engineering Company Pte Ltd (Singapore)
- ▶ **Practice and Thinking on synergy between coastal zone ecology and disaster reduction**
Wang Rong, Xu Wei. China Harbour (s) Engineering Company Pte Ltd (Singapore)
- ▶ **The 6-7 April 2020 Meteotsunami Along The Coast Of Vanuatu**
Wang Gang, Wang Rong. China Harbour (s) Engineering Company Pte Ltd (Singapore)
- ▶ **Study On Effective And Land Efficient Wave Overtopping Mitigations At Singapore Slope Revetment**
Eunice Chin. Jtc Corporation (Singapore)
- ▶ **Merging Blue-Green Infrastructure With Urban Design – A Water Master-Planning Approach In Four Quadrants**
Nanco Dolman. Royal HaskoningDHV (Netherlands)
- ▶ **Keeping Airports Open In Times Of Climatic Extremes – Planning For Climate Resilient Airports**
Nanco Dolman, Vivekanandhan Sindhamani. Royal HaskoningDHV (Netherlands)
- ▶ **Water Sensitive Urban Design Performance In Singapore: Monitoring With Low-Cost Sensors**
Ning Ding, Perrine Hamel, Frederic Cherqui, Jean-Luc Bertrand-Krajewski, Qingchuan Zhu. Nanyang Technological University (Singapore)
- ▶ **W-Lab Resets Innovation In The Australia-New Zealand Water Industry**
Alex Cech. Isle Utilities Asia-pacific (Phillippines)
- ▶ **Modelling Stormwater Reuse Scenarios For Green Roof Irrigation Using URBIS**
Vincent Pons, Jean-Luc Bertrand-krajewski. INSA - Lyon (France)
- ▶ **Sustainable Water Solutions To Increase Yields And Improve Quality In Recirculating Aquaculture System (Ras)**
Xiangyi Qiao, Diane White. Evoqua Water Technologies (Singapore)
- ▶ **Re-Imagining River Cities Of Future**
G Asok Kumar, Jyoti Verma, Sharmi Palit, Ruchi Tomar. National Mission For Clean Ganga, Government Of India (India)
- ▶ **Advanced Urban Water Management To Efficiently Ensure Bathing Water Quality: The I bathwater Project**
Jordi Cros. Adasa (Spain)

LIST OF POSTER PRESENTERS

Theme 4: Cities of the Future

- ▶ **Assessing Digital Water Governance Systems In Smart Cities**
Ulf Stein, Doris Knoblauch, Benedict Bueb. Ecologic Institute (Germany)
- ▶ **How CDS Technology Can Help To Retrofit And Upgrade Existing Aging Stormwater Infrastructure Into Smart Stormwater Treatment System In Order To Improve Water Quality**
Yale Wong. Ecoclean Technology Sdn Bhd (Malaysia)
- ▶ **Water Scarcity And Its Solutions: A Comparative Study Of Singapore, Muscat And Gwadar**
Aadersh Humza. Balochistan Think Tank Network (btttn) (Pakistan)
- ▶ **A Review Of Water Demand Management Practices In ASEAN**
Corinne Ong, Cecilia Tortajada, Ojasvee Arora. Institute Of Water Policy, National University of Singapore (Singapore)
- ▶ **Cool Cities In The Era Of Urban Heat**
Adrian Moredia Valek. Arcadis Netherlands BV (Netherlands)
- ▶ **High-Relief Artificial Reefs For Biodiversity Enhancement And Coastal Defence**
Santosh Kumar Srirangam, Loke Ming Chou, John Kiong, Karenne Tun. HSL Constructor Pte Ltd (Singapore)
- ▶ **CDM Smith – Digitalizing: Harnessing the Potential of Digital Transformation In Data-driven Water Solutions**
Ralf Bufler. CDM Smith Europe GmbH (Germany)
- ▶ **National University of Singapore**
Rajat Mishra. National University of Singapore (Singapore)

LIST OF POSTER PRESENTERS

Theme 5: Water Quality & Health

- ▶ **Disinfection By-Products Formation In Reclaimed Water By Ozone/BAC And UV/Chlorine Treatment Processes**
Y Zhong, S L Ong, Jianguo Hu, W S Ang, B Viswanath. National University of Singapore (Singapore)
- ▶ **Prevalence Of Antibiotic Resistant Genes (Args) In Urban Rivers**
Mohomed Niyaz Mohomed Shayan, Takashiro Onodera, Ryuuta Miyajima, Yuuya Akazawa, Hisashi Satoh. Hokkaido University (Japan)
- ▶ **Marine And Coastal Planning In The Context Of Singapore's Seawater Quality Conditions**
George Foulsham, Robert Nichols, Andre Low. DHI Water & Environment(s) Pte Ltd (Singapore)
- ▶ **Characterization Of Stormwater Runoff Based In Microbial Source Tracking Methods**
Ricardo Santos, Silvia Monteiro, Gaspar Queiroz, Filipa Ferreira. Instituto Superior Técnico (Portugal)
- ▶ **Removal Efficiencies Of Human Coronaviruses (Hcov-OC43 And Hcov-229e) By Simulated Coagulation-Flocculation Process With FeCl₃ And Polydadmac**
Muhammad Hasif Jemain, Nusrat Jahan, Caixia Li, Shane Snyder, Mauricius Marques Dos Santos. NEWRI-NTU (Singapore)
- ▶ **Chlorination Disinfection By-Products Of Nonylphenol Induce Cellular Metabolic Changes In Vitro**
Jewel Zi Le Toh, Caixia Li, Shenglan Jia, Mauricius Marques Dos Santos, Shane Snyder. NEWRI-NTU (Singapore)
- ▶ **Use Of Wastewater-Base Epidemiology (WBE) To Monitor Temporal Consumption Patterns In Singapore**
Jia Wei Yuen, Wen Jun Stanley Khor, Nusrat Jahan, Caixia Li, Mauricius Marques Dos Santos, Shane Snyder. NEWRI-NTU (Singapore)
- ▶ **Single Cell Detection For E. Coli Using A Digital Microwell Array Chip**
Ai Qun Liu, Wenshuai Wu, Thi Thanh Binh Nguyen, Yang Liu. Nanyang Technological University (Singapore)
- ▶ **Is The Global Water Sector Meeting The Challenge Of PFAS?**
Tony Koodie, James Kennedy, Andrew Elphinston, James Ostrowski. Binnies (United Kingdom)
- ▶ **The Microplastics Dilemma For The Water Industry.**
Tony Koodie, Linley Hastewell, Anne-Marie Palfrey, Dylan Powell, Fay Couceiro. Binnies (United Kingdom)
- ▶ **Scale-Up Testing Of Para-D 4.0 In Water Plant**
Qian Bin Zhao, Thi Thanh Binh Nguyen, Hai Long Li, Yang Liu, Jing Bo Zhang, Chang Nong Lim, Shao Bo Luo, Prakash BN, Yuan Cheng Zhan, Naveen Chandhavarkar, Jian Jun Qin, Chin Wei Chow, Erica Michelle De Souza, Jeff Aw, Ai Qun Liu. Nanyang Technological University (Singapore)

LIST OF POSTER PRESENTERS

Theme 5: Water Quality & Health

- ▶ **A Focus-Forming Assay (Ffa) For The Detection Of Human Coronavirus (Hcov-Oc43)**
Mauricius Marques Dos Santos, Nusrat Jahan, Caixia Li, Shane Snyder. NEWRI-NTU (Singapore)
- ▶ **Regulated Chlorate Generation Using On-Site Electro-Chlorination (OSEC®) B PLUS System**
Xiangyi Qiao, Romulo Conde. Evoqua Water Technologies Pte Ltd (Singapore)
- ▶ **Water Resources Challenges And Mitigation: Alignment And Response To UN SDG's In Philippines Setting**
Robinson Salenga, Maria Sophia Orticio. Maynilad Water (Phillippines)
- ▶ **Achieving Sustainable Water Resources By Adopting Technological Advancement In Preserving Water Sources And Delivering Safe Water In Accordance To UN SDG's Mandate**
Robinson Salenga, Maria Sophia Orticio. Maynilad Water (Phillippines)
- ▶ **SARS-Cov-2 Detection In Water Via Photonic Sensor Chip**
Binh Ngyuen, Min Min You, S.C Chen, Zhenyu Li, Jinguan Liu, Yuzhi Shi, Hongwei Zhao, Xiaohong Zhou, Yi Zhang, Eric Yap, Ai Qun Liu. Nanyang Technological University (Singapore)
- ▶ **Effect Of Extended Stagnation On The Quality Of Drinking Water In An Above-Ground Network In The Tropics**
Dan Cheng, Mats Leifels, Sophia Wu, Nadhirah Nasha, Jiawei Cai, Eric Hill, Nico Boon, Jorien Favere, Andrew Whittle, Stefan Wuertz. Nanyang Technological University (Singapore)
- ▶ **Water Reuse To Protect Aquatic Ecosystems And To Reinforce Drinking Water Supply In A Mediterranean Urban Area**
Antoni Munne. Catalan Water Agency (Spain)

Theme 6: Nexus & Circularity

- ▶ **The Davao City Bulk Water Supply Project “Water – Energy Nexus”**
Shake Tuason, Libert Lomuntad. Apo Agua Infraestructura, Inc. (Philippines)
- ▶ **An Operational Framework To Quantify The Sustainability Of Water Resource Recovery Facilities**
Maria Faragó, Martin Rygaard, Anders Damgaard, Morten Rebsdorf. Technical University of Denmark – DTU Environment – Water Technology & Processes (Denmark)
- ▶ **Water/Energy Nexus: Exploring Opportunities To Link Water Projects To Energy Independence And Sector Decarbonization**
Emma (Ruqiao) Shen, Julian Sandino, Bill Desing. Jacobs (Canada)
- ▶ **Water and Energy Circularity – Promoting Water Resiliency And Energy Recovery Through Used Water Treatment Plant At KC Valley, Bengaluru**
Gaurav Bhatt. Jacobs (India)
- ▶ **Microbial Protein Production Through Mixed-Culture Anaerobic/Aerobic Fermentation Of Soybean Processing Wastewaters Of Variable Chemical And Microbial Composition**
Ramanujam Srinivasan Vethathirri, Ezequiel Santillan, Sara Swa Thi, Hui Yi Hoon, Stefan Wuertz. Nanyang Technological University (Singapore)
- ▶ **Saline Water-Based Mineralization Pathway For Gigatonne-Scale CO2 Management**
Gaurav Sant. UCLA (United States)

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