

THE GLOBAL PLATFORM TO SHARE AND CO-CREATE INNOVATIVE WATER SOLUTIONS 1-5 JUNE 2014

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# WATER CONVENTION ADVANCE PROGRAMME



REGISTRATION FOR WATER CONVENTION OPENS IN JANUARY 2014. VISIT WWW.SIWW.COM.SG/WATER-CONVENTION FOR MORE INFORMATION.

> WATER CONVENTION IS JOINTLY ORGANISED BY:



# SINGAPORE INTERNATIONAL WATER WEEK

Singapore International Water Week (SIWW) is the global platform to share and co-create innovative water solutions. Understand how sustainable water management is essential for liveable cities and shape the future of water and cities at SIWW 2014, the world's only integrated event on water and urban sustainability. Be part of a whole suite of activities focused on business, networking and innovative solutions.

In line with global water industry trends and opportunities, SIWW 2014 will feature discussions on five themes, namely Municipal Water, Industrial Water, Integrated City-Environment-Water, and Future of Water. The event's flagship programmes include the Lee Kuan Yew Water Prize, Water Leaders Summit, Water Convention, Business Forums, Water Expo, TechXchange and Industrial Water Solutions Forum.

# **PROGRAMME AT A GLANCE**

Date	Morning	Late Morning	Aftern	oon	Late Afternoon	Evening
			V	VCS, SIWW & (	CESS Site Visits	Opening Ceremony &
Sunday 1 June	World Cities Sur	on Only)	10th Asia Pacific Infrastructure Ministers Meeting (By Invitation Only)		Welcome Reception Guest-of-Honour: Mr Lee Hsien Loong,	
i June			World Cities Summit Programme			
		Prime Minister of Singapore				
		TechXchange	(By Invitation Only	)		
		Water Expo, World Cities Sum	mit City Showcase	& WasteMET A	sia	
			Lee Kuan Yew	Water Cor	vention Poster Presentation	Lee Kuan Yew Water Prize Award
Monday			World City Prize	World Cities Summit Programme		Ceremony & Banquet
2 June	In-Conversation	Opening Plenary	Lecture &	CleanE	nviro Summit Programme	Guest-of-Honour:
			Singapore Water	United Nations Secretary-Generals' Advisory Board on Water and Sanitation 22nd Meeting (By Invitation Only)		Dr Tony Tan, President of Singapore
	60 Minutes with Water Leaders	Water Leaders Roundtable	Water Leaders	wcase & WasteMET Asia .eaders Dialogues Water Leaders Summit Closing Session		
Tuesday 3 June		Networking Events by Partners & Sponsors				
3 June						
	United Nations Secr					
Wednesday						
4 June		Closing Dinner				
	World Cities S					
	United Nations Secr	etary-Generals' Advisory Board	on Water and Sanit	ation 22nd Me	eting (By Invitation Only)	
Thursday 5 June	SIWW	Site Visits				

Singapore International Water Week

World Cities Summit

CleanEnviro Summit Singapore

Joint Programme

Co-located Events

# WATER CONVENTION 2014

The Water Convention will provide a platform for water professionals to address contemporary challenges by sharing experiences, case studies, practical applications of technological solutions, and management strategies that will improve the efficiency and effectiveness of water and wastewater systems as well as examine issues related to municipal and industrial water sustainability and urban planning.

The Water Convention 2014 continues to sustain dialogue on a wide range of topics along five themes:

- 1. Delivering Water from Source to Tap
- 2. Effective and Efficient Wastewater Management
- 3. Water for Liveability and Resilience
- 4. Water Quality and Health
- 5. Water for Industries

Water for Industries is the latest addition to the Water Convention. It serves to highlight the importance of affecting change in the way water and wastewater is used and managed by the industrial sector, which has been identified as the second largest water consumer in the world. Industries worldwide have been forced to search for innovative solutions to improve water sustainability across the value chain. Though currently accounting for up to 25% of the world's water consumption, many industries have yet to implement sustainable water management practices within the sector. This aims to raise awareness and pool ideas to improve industrial water sustainability.

### **PROGRAMME COMMITTEE**

Harry Seah	Chief Technology Officer, PUB (Singapore)
Darryl Day	Executive Director, Energy Policy, Department of Mines and Energy (Australia)
Adam Lovell	Executive Director, Water Services Association of Australia (Australia)
Alan Baird	Senior Water Supply and Sanitation Specialist, Asian Development Bank (Philippines)
Albert Janssen	Manager Water R&D, Global R&D Coordinator Water Handling, Shell (The Netherlands)
Andrew Shaw	Global Practice and Technology Leader in Sustainability and Wastewater, Black & Veatch (USA)
Anusuyah Bai S.K. Sivalingam	Head of Asset Management Unit, Indah Water Konsortium (Malaysia)
Chong Hou Chun	Director, Water Supply Network, PUB (Singapore)
D.V. Darshane	Director, Policy, Product & Technology, The Coca-Cola Company (USA)
Enrique Lopez Calva	Technical Director, Neysadurai Centre for Integrated Urban Solutions, CDM Smith (USA)
Glen Trickle	Head of R&D for Treatment Business Unit, Xylem (USA)
Jerry Liu Jianlin	Vice President, Water – Process and Technology, Sembcorp Industries Ltd (Singapore)
Johan Groen	Vice President, Head of Dewatering Business Line, Outotec Corporation (Finland)
Jonathan Clement	CEO, PWN Technologies (The Netherlands)
Marion Savill	Executive Director, Affordable Water (New Zealand)
Martin Wagner	Professor, Technical University of Darmstadt (Germany)
Ong Choon Nam	Director, NUS Environmental Research Institute, National University of Singapore (Singapore)
Pascal Dauthuille	Director, Projects, CIRSEE, Suez Environnement (France)
Paul Reiter	Strategy Advisor, International Water Association (Singapore)
Ramon Alikpala	Chairman, Metropolitan Waterworks and Sewerage System (Philippines)
Robert Bos	Senior Advisor, International Water Association
Robert Skinner	Professorial Fellow, Centre for Water Sensitive Cities, Monash University (Australia)
Tao Li	Director, IWA China Regional Office, International Water Association (China)
Tsui Wai	Deputy Director, Drainage Services Department (Hong Kong)

### MESSAGE FROM THE EXECUTIVE DIRECTOR OF ENVIRONMENT & WATER INDUSTRY PROGRAMME OFFICE (EWI)



**Chew Men Leong** Executive Director, Environment and Water Industry Programme Office & Chief Executive, PUB Singapore

It is with great pleasure that I invite you to attend Singapore International Water Week (SIWW) 2014, which will be held from 1–5 June 2014 at the Sands Expo and Convention Centre, Marina Bay Sands in Singapore.

The global platform for the sharing and co-creation of innovative water solutions, SIWW attracts decision makers across the entire water value chain, allowing the global water industry to collaborate on new market opportunities. The highlights of SIWW include the Water Convention, Water Leaders Summit, Water Expo, Business Forums as well as the presentation of the Lee Kuan Yew Water Prize, a prestigious international award that acknowledges outstanding contributions towards solving the world's water issues.

In September last year, over 180 water leaders from 46 countries took part in the inaugural SIWW Water Utilities Leaders Forum (SWULF), a two-day forum that identified key challenges and solutions for water utilities. It was clear that there are issues for utilities to overcome, and that collaborations between multiple stakeholders such as the urban planners, agriculture, environment, energy and the manufacturing industries, will be required to meet these challenges. We will continue these conversations at SIWW 2014 with a larger audience of policymakers, industry leaders and researchers. The fifth edition of SIWW in 2012 achieved a new record of more than 19,000 participants from 104 countries and regions. \$13.6 billion in total value of announcements on projects awarded, tenders, investments, and R&D MOUs were made at the event as well. This year, we look forward to meeting a diverse group of delegates to discuss water issues with an integrated Cities-Water-Environment approach. You can also expect to see a greater focus on industrial water solutions, the commercialisation of innovative technologies, as well as stronger youth engagement.

I would like to thank the Water Convention Programme Committee for their strong support of the event. Comprising key leaders from the global water industry, an exciting programme that will create thought-provoking water dialogues has been planned. In addition, I would like to express my appreciation to the International Water Association, our strategic partner for the last six years, who has worked with us to grow the Water Convention into an important platform that stimulates in-depth discussions on emerging water issues and provides networking opportunities for water professionals, industry leaders and practitioners. I am confident that together with the other flagship events at SIWW, the Water Convention 2014 will continue to provide a rewarding experience for everyone.

I look forward to seeing you in Singapore in June 2014.

### MESSAGE FROM THE PRESIDENT OF THE INTERNATIONAL WATER ASSOCIATION (IWA)



**Glen T. Daigger,** Ph.D., P.E., BCEE, NAE President, International Water Association

As the Singapore International Water Week (SIWW) transitions to its biennial format in 2014, the International Water Association (IWA) is very pleased to continue its long-standing collaboration as a strategic partner and coorganiser, with PUB, of the Water Convention.

The Water Convention retains its highly successful format, but this year it extends its content to explicitly address industrial water issues. The programme includes the highly successful Sunday workshops; the Tuesday morning plenary; and parallel sessions on water and wastewater treatment, Cities of the Future, and public health. This format is supplemented this year with a Sunday workshop focused on industrial water issues, inclusion of industrial water issues in the Tuesday morning plenary, and an additional full parallel technical track specifically addressing industrial water topics. These additions provide content which will enrich the experience of those interested in both traditional and industrial topics. These topics, coupled with the Expo, will provide an extremely interesting programme for those interested primarily in industrial topics. The expanded programme will attract a wider range of professionals which will enrich the exchange of knowledge and experience for all.

Through the SIWW Water Convention, IWA in collaboration with PUB has successfully established a leading platform for showcasing and generating discussions on best practices and proven applications to solve water problems in the highly urbanised environments in Asia. This is extended in 2014 to include industrial water and to deliver a high quality programme in the 2014 Water Convention that will allow water sector experts and professionals to share knowledge, exchange experiences, and learn from one another to improve water and wastewater services delivery.

Those of you interested in urban and industrial water issues are kindly invited to attend and participate in the Water Convention at the 2014 SIWW. You will benefit from the knowledge and experience of others and contribute yours to the overall discussion.

### MESSAGE FROM THE CO-CHAIRS OF THE WATER CONVENTION 2014 PROGRAMME COMMITTEE



Harry Seah Chief Technology Officer, PUB Singapore

In March 2012, the World Health Organisation reported that the Millennium Development Goal (MDG) of halving the proportion of people without sustainable access to safe drinking water had been met, in advance of the 2015 deadline. This was very encouraging news, but it also serves to remind us that there is still much work to be done, as there remains approximately 10% of the global population who do not have such access to safe water, and sanitation still lags far behind the targets.

It is heartening then that during the Water Convention 2014 Call for Papers, we received more than 500 papers from 58 countries on topics such as water and wastewater technology and operations, the creation and management of sustainable and liveable cities, and water quality and health. This overwhelming response shows that the world's water professionals are working hard on water solutions for a sustainable world and the Water Convention is fulfilling its goal as a leading platform to share and co-create innovation water solutions. We would also like to thank you for your continued support for the Water Convention.

With such a large number of high quality abstracts to choose from but a limited number of presentation slots available, the Programme Committee had a tough task of deciding on the final programme. This year is also the first in which we are introducing a new theme on "Water for Industries", to



**Darryl Day** Executive Director, Energy Policy, Department of Mines and Energy, Australia

reflect the growing importance of engaging the industries, who are the second largest water consumers in the world. We are confident that you will find the Water Convention 2014 programme an interesting and highly relevant one.

Besides the technical sessions, the Convention will feature a dedicated Poster Presentation Session, a popular event with delegates and presenters engaging in lively discussions. Another feature of the Water Convention which delegates can look forward to is the *Hot Issues* Workshop series. For 2014, we will explore a range of issues such as sustainable water solutions for industrial precincts, water resilient cities, mainstream deammonification, potable water reuse, and water supply for extreme events. Each of the workshops will feature panel discussions and promises to be an interesting platform for lively exchange of ideas and opinions between the panel of experts and delegates.

The Water Convention 2014 programme is shaping up to be an exciting one, with presentations that are highly relevant to our current water challenges. We hope you will take this opportunity to join us to share your experiences and contribute your know-how, so we can create liveable and sustainable cities collectively as a global water community. We look forward to welcoming you to the Singapore International Water Week's Water Convention in June 2014.

# WATER CONVENTION 2014 PROGRAMME

	Theme 1: Delivering Water from Source to Tap		Theme 2: Effective and Efficient Wastewater Management		Theme 3: Water for	Theme 4: Water Quality	Theme 5: Water for			
SESSIONS	(A) Networks	(B) Treatment	(A) Treatment Processes & Energy Recovery	(B) Asset Management & Resource Recovery	Liveability and Resilience	& Health	Industries			
Sunday	Water Convention Hot Issues Workshops									
1 June	Opening Ceremony and Welcome Reception									
	In Conversation									
Monday	Opening Plenary									
2 June	Singapore Water Lecture									
			Water Conven	tion Poster Preser	ntation Session					
			Water Co	onvention Keynot	e Session					
	Asset Management and Optimisation	Membrane Innovations	Membrane Bioreactor Technologies	Sewerage Asset Management	Embedding Water Thinking in Urban Planning	Water Safety Plans	Technologies for Reuse, Recovery & Recycling			
Tuesday 3 June	Intelligent Water Network – Water Quality Monitoring	Membrane Application and Operations	Biofilm Technologies	Urban Drainage Management	Water for Liveability	Protecting Source Water Quality	Innovative Technologies – Food & Beverage Industry			
	Intelligent Water Network – Sensor Technologies	Membranes in the Future	AB Process	Decentralised Water Technologies	Integrated Water Management for Resilience I	Monitoring & Tracking of Contaminants	Delivering Success in Operations			
	Operation and Maintenance of Innovative Decentralised Systems	Addressing Pathogens and Emerging Contaminants	Energy-Water -Waste Nexus 1	Reuse	Integrated Water Management for Resilience II	Contaminants of Emerging Concern – Detection Methods	Business Case of Water Sustainability			
Wednesday 4 June	Non-revenue Water	Water Reuse Advancements	Energy-Water -Waste Nexus 2	Resource Recovery	Integrated Water Management for Resilience III	Contaminants of Emerging Concern – Management & Treatment Technologies	Water Solutions for the Oil & Gas Industry			
		Sustainable Treatment for Cities of the Future	Energy Savings in Wastewater Treatment Plants	Anaerobic Digestion	Getting All Stakeholders on Board – Engagement Strategies	Have We the Tools? Assessment, Management and Monitoring in WSPs	Innovative Technologies – Mining Industry			
		Applying Leading Edge Technologies	Aerobic Granular Sludge	Biosolids	The Right Institutional and Governance Arrangements (Panel Discussion)	Future Issues	How is Industry Solving Their Future Water Challenges? (Panel Discussion)			

Information accurate as of December 2013.

# WATER CONVENTION 2014 HOT ISSUES WORKSHOPS

Five Water Convention Hot Issues workshops will be offered during Singapore International Water Week 2014, all taking place on Sunday, 1 June 2014. 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 in Asia. This will serve as the perfect opener to the technical sessions on 3–4 June 2014.

### WORKSHOP PROGRAMME

The details of the five workshops are as follows:

Date	Time	Workshop Topics	
		Workshop 1: Exploring New Treatment Paradigms for Potable Water Reuse	
	MORNING 0900 – 1200hrs	Workshop 2a: Next Generation Biotechnologies for Wastewater Treatment – Nutrient Management	
Sunday		Workshop 3: Adapting Cities for Flood Resilience	
1 June 2014	AFTERNOON 1400 – 1700hrs	Workshop 2b: Next Generation Biotechnologies for Wastewater Treatment – Anaerobic Membrane Bioreactors	
		Workshop 4: Water Supply for Extreme Events	
		Workshop 5: Sustainable Water Solutions for Industrial Precincts	

For more details regarding the content of the topics and the speakers, please see www.siww.com.sg

### WORKSHOP SYNOPSIS

#### Workshop 1: Exploring New Treatment Paradigms for Potable Water Reuse

Many modern cities today face the issue of rapid population growth and migration, resulting in an unprecedented strain on regional water resources. Water recycling has been used in many cities as an alternative water resource and it has been incorporated into the long-term water supply plan for many utilities. Advanced water treatment technologies available today have enabled utilities to meet the stringent water quality standards for potable water reuse.

In most cases, potable water reuse has meant the inclusion of both reverse osmosis and advanced oxidation. The technology decision is driven by both technical (mainly contaminant removal) and public perception, where nearly complete removal of contaminants will help to improve public acceptance. With more alternative technologies available and more operating experience from existing facilities, alternative treatment which could be far less costly should be explored. This workshop aims to promote discussions on the examining alternative treatment schemes to achieve both direct and indirect potable reuse.

#### Workshop 2:

#### Next Generation Biotechnologies for Wastewater Treatment – Nutrient Management and Anaerobic Membrane Bioreactors

Global increases in water demand and decreases in both the quantity and quality of fresh water resources have served as major driving forces to develop sustainable use of water resources. One viable alternative is to explore non-traditional water sources through reclamation and reuse of wastewater.

The aim of this workshop, which is co-organised with the King Abdullah University of Science and Technology (KAUST), is to highlight emerging biotechnologies that can treat wastewater to a quality that is suitable for reuse while at the same time harvesting energy, recovering resources and minimising carbon footprint. This workshop brings together distinguished researchers and industrial speakers to share their experiences and best practices for applying these technologies in a tropical climate.

The first half of the workshop will focus on the deammonification process for nutrient removal from wastewater streams, covering fundamental research and pilot and full-scale testing results. The second half will focus on the current and potential developments of anaerobic membrane bioreactors.

#### Workshop 3: Adapting Cities for Flood Resilience

Within the context of increasing urban density and a changing climate, it is anticipated that future cities will become more vulnerable to flood hazards. The traditional approach to flood mitigation is becoming less relevant due to increased flood vulnerabilities and less quantifiable risk profile. A reexamination of the traditional approach to adapting cities for flood resilience is necessary.

Flood resilience strategies may be different depending on whether a city is vulnerable to fluvial, pluvial or a combination of both flooding characteristics. Furthermore, these strategies will need to encompass the three distinct resilience phases associated with prevention/mitigation of the hazard, response during the occurrence of floods and recovery following floods. It is envisaged that urban planning, infrastructure design, institution arrangements and community participation are key elements of such a framework.

The workshop, which is co-organised with the Cooperative Research Centre for Water Sensitive Cities, Australia, is aimed at developing a common framework for adapting cities for flood resilience. The workshop programme will consist of a number of scene-setting plenary presentations by invited international specialists, in each case making references to case studies to illustrate potential key elements of a flood resilience framework. These presentations will be followed by a facilitated workshop discussion and development of the framework for adapting cities for flood resilience.

#### Workshop 4: Water Supply for Extreme Events

In recent years, many countries have faced extreme climate and weather events, and it is expected that these extreme events will become more frequent and intense in the future. These extreme events cause devastating infrastructural impact, leading to compromised water safety and security. The lack of access to safe drinking water not only poses a

### WHO SHOULD ATTEND

The workshops will be of interest to industry experts, academics, policy makers, and practitioners. The Hot Issues workshops are open to all Water Convention delegates. major threat to public health, it would also severely impact a country's economic development. As this issue grows in importance, the water sector needs to identify best practices and explore new technologies to be ready for such extreme events.

This workshop creates a platform for water utilities, governments, and community partners to share potential solutions and develop strategies which could be implemented during these extreme events. The workshop will feature a series of case studies from both developed and developing countries that have experienced extreme events such as typhoons, earthquakes, hurricanes, and floods in recent years.

Through the sharing of experiences and lessons learnt, the workshop participants will have the opportunity to discuss on the preparedness, emergency response, and long-term resilience necessary to mitigate and adapt to the potential impacts of these events.

#### Workshop 5: Sustainable Water Solutions for Industrial Precincts

It is estimated that 22% of the current global water use comes from industries and this rapidly rising demand will soon surpass that of domestic water demand, making it pertinent to kick-start the conversation on sustainable water solutions for industries. However with the widely varying process solutions for different industries also resulting in varying process water and wastewater characteristics, there is no one-size-fits-all approach and policy makers and water utilities often face an uphill task when trying to implement an integrated industrial water cycle management system.

The discussions in this Workshop will be centred on developing opportunities for the development of sustainable water solutions for industrial precincts. The prevalence of industrial precincts or zones throughout Asia, with the synergistic clustering of businesses within each precinct, provides the common platform for discussion on industrial water solutions, a platform which is often lacking when bringing different industries together. It would serve as a good starting point which participants will be able relate to, especially in the context of the Singapore International Water Week.

This workshop will feature case studies from industrial precincts around Asia, with key stakeholders sharing the planning challenges and key drivers for developing sustainable water management plans. This would encourage the sharing of ideas and bring together adopters and providers of innovative technologies to discuss potential collaborations to move the industry closer towards sustainable water practices.

Exhibitors and trade visitors may register to attend the workshop at a nominal fee of S\$150.

#### THEME 1A: NETWORKS – DELIVERING WATER FROM SOURCE TO TAP

#### Department of Water Affairs (DWA): Water Services Asset Management Strategy: 'Getting Started' Guideline on Developing an Asset Management Plan M. Bannister, T. Rasikhanya. Department

of Water Affairs (South Africa)

Efficient Asset Management and Effective Facilities Maintenance (Replacing Aging Pipes and Improving into Earthquake Resistant Facilities) S. Momiyama, T. Konishi, H. Take. Yokohama Waterworks Bureau (Japan)

### Online Water Quality Monitoring in the Distribution Network

B. Graaf, F. Williamson, M. K. Koerkamp, Jos-Willem Verhoef, J. Hoogterp,E. Trietsch, W. V. Delft. Vitens N.V. (Netherlands)

#### Full Scale Implementation of "Smart" Early Warning Systems for Real Time Monitoring of Contaminant Intrusion in the Distribution Networks Z. D. Quang, F. Campan. Suez Environnement (France)

#### A New Paradigm for Water Management N. Kapoor. IBM (United States)

### An Architectural Framework for the Smart Water Grid

A. Hauser, F. Roedler. TUV SUD (Singapore)

#### Multilevel Sub-Zoning of Water Distribution Systems

L. Sela, A. Preis, M. Iqbal, M. Allen, A. Whittle. MIT (United States)

#### Real-Time Monitoring Platform to Improve the Drinking Water Network Efficiency

A. Preis, M. Allen, M. Iqbal, R. Ellison, B. Kompella, A. Whittle. Visenti (Singapore)

### Private Firms as Operators: Key to Sustainable Water Services Delivery in Rural and Periurban Areas

C. Tiwari. SNV Netherlands Development Organisation (Kenya)

### Counting the Lost Drops (SA's Study into Non-Revenue Water)

J. Bhagwan, R. Mckenzie, W. Wegelin. Water Research Commission (South Africa)

#### A Statistical Tool for Leakage Assessment and Detection on Partially AMR Equipped DMA

K. Claudio, C. Leclerc, Y. L. Gat, V. Couallier, J. Saracco. Lyonnaise des Eaux (France)

#### Are We Repairing the Right Leaks? M. Tamir. TaKaDu (Israel)

#### THEME 1B: TREATMENT – DELIVERING WATER FROM SOURCE TO TAP

#### Commercialisation of Low-Energy Electrodialysis Technology for Seawater Desalination K. H. Ng, M. Shaw, L. S. Liang, J. Gifford. Siemens Pte Ltd (Singapore)

### Low-Fouling RO Elements

H. Li, S. Lu, P. Yun, Z. Liu, C. Wang, J. Huang, W. Peng. GE (China)

#### Pilot Study of Closed Circuit Desalination (CCD) Technology to Increase NEWater Recovery

H. Wang, X. Q. King, S. Lee, K. Chen, J. Qin, H. Seah. Public Utilities Board (Singapore)

#### Result for Two Years Demonstration of Energy Saving Seawater Desalination System

S. Aso, Y. Sekine, H. Takabatake, J. Cheon, Y. Sugawara, T. Uemura, T. Shinoda. Global Water Recycling and Reuse Technology Research Association (Japan)

#### Treatment and Beneficial Use of Desalination Concentrate: Development of Efficient Engineering Systems with Electrodialysis

P. Xu, T. Y. Cath, M. Reinhard, J. O. Leckie, N. Khandan. New Mexico State University (United States)

#### Water Quality Evaluation Method for RO Fouling Potential Using Quartz Crystal Microbalance

K. Nakano, Y. Sakigawa, K. Kitamura, S. Yoshikawa. Yokohama Research Laboratory, Hitachi, Ltd. (Japan)

#### Pilot Scale Ion Exchange and Ceramic Membrane Filtration of Surface Water

D. Metcalfe, C. Rockey, G. Galjaard, H. Shorney-Darby. South West Water (United Kingdom)

### Aquaporin Z Embedded Membrane for Water Purification

W. Xie, Y. W. Tong. NUS Environmental Research Institute (Singapore)

#### A Pilot-Scale Investigation of Ozonation and Advanced Oxidation Processes at Choa Chu Kang Waterworks

J. Wang, W. S. Ang, R. Xie, A. Ried. Xylem Services GmbH (Germany)

Field Results Showing Effective Removal of Taste and Odour Causing Compounds Using UV-Oxidation S. Bindner, M. Kuhns, A. Festger. Trojan Technologies (Canada)

#### Significant Reduction of Micropollutants in Municipal Waste Water with an Active-Coke-Bioreactor (ACFBB) Reinforced by a Following UV-Treatment

P. Karl, E. J. Martin, J. Turk, A. Boergers. AQUA-bioCarbon GmbH (Germany)

#### **Demonstrating Potable**

Reuse Feasibility M. Steirer. City of San Diego (United States)

#### The Gippsland Water Factory – Recent Australian Experience with Industrial and Urban Ecology A. Hodgkins, G. Daigger, P. Skeels.

CH2M HILL (Australia)

#### The Champagne Flush: A Sparkling New and Green Solution for the Biofouling Problem in Current Membrane Plants

B. Rietman, A. Kemperman, A. Reigersman, P. Wessels, W. V. D. Meer. Vitens NV (Netherlands)

### Chlorine Dioxide Tolerance of Polyamide RO Membrane

C. Yang, M. Zhao, X. Zhao, H. Zhu, Q. Chu, Y. He. The Dow Chemical (China) Investment Company (China)

Improving the Performance of Polymeric and Ceramic UF Membrane Performances for the Treatment of Bio-Organic Challenging Seawater L. Dramas, J.P. Croue. KAUST (Saudi Arabia) UV AOP for Taste and Odour Removal – Comparing Low Pressure and Medium Pressure for a Full Scale Installation J. Scheideler. Xylem Services GmbH (Germany)

Sea Water Reverse Osmosis – Energy Efficiency & Recovery A. Evenden. Acciona Agua (Australia)

#### Malaysia's Largest River Bank Filtration (RBF) & Ultra-Filtration (UF) System for Municipal Drinking Water Production

C. M. Chew. Techkem Water Sdn. Bhd. (Malaysia)

#### THEME 2A: TREATMENT PROCESSES & ENERGY RECOVERY – EFFECTIVE AND EFFICIENT WASTEWATER MANAGEMENT

#### MBR with Enhanced Primary Treatment to Reduce Energy Consumption

J. Peeters, G. Vicevic, W. Syed. GE Water & Process Technologies (Canada)

#### Low Energy Consumption MBR + RO Process for Water Reclamation in Singapore

H. Suzuki, S. Hanada, H. Seah, T. Kitade, T. Uemura, M. Henmi. Toray Singapore Water Research Center (Singapore)

#### Membrane Biofouling Control by Encapsulated Quorum Quenching Bacteria in an External Submerged MBR

D. Jahangir. Water Environment – Membrane Technology Laboratory (Pakistan)

#### Demonstration Plant Testing of Industrial Used Water Treatment Process in Jurong Water Reclamation Plant for Water Reuse

O. Takase, T. Watanabe, M. Mitsumizo, T. Niwa, Y. Zhao, K. Kekre, L. Lin, G. Tao. Meidensha Corporation (Japan)

#### Sustainable Wastewater Treatment with the Innovative CFIC® Biofilm Reactor Process

J. G. Siljudalen, L. Marcolini, P. Stang, B. Rusten. Biowater Technology (Norway)

#### Membrane-Aerated Biofilm Reactor for Nitrogen Removal in Low Energy Treatment of Municipal Sewage N. Adams, Y. Hong, J. Ireland, H.

Koops, P. Cote. GE Water and Process Technologies (Canada)

#### Practical Experience with Full Scale Structured Sheet Media IFAS Systems for Nitrification

H. Li, J. Zhu, J. Flamming, J. Oconnell, M. Shrader, B. Rothermel, F. Kulick III. Brentwood Industries (United States)

#### Effects of Air/Liquid Ratio and Ammonia Load Rate on Nitrogen Removal in a BAF

W. Zhang, Y. Peng, Q. Liu, Y. Liu, S. Wang. Beijing University of Technology (China)

#### Activated Sludge Retention by Dynamic Filtration at Super-Critical Fluxes for Sustainable WWT

K. Roest, B. Daamen, L. Hartog, M. van Loosdrecht. KWR Watercycle Research Institute (Netherlands)

### Energy Self-Sufficiency for WWTP in Warm Climate

M. Andersen, M. Choo-Kun, W. Wellym, Z. B. Zhang, D. Conteau, P. Dauthuille, N. Zainal Abidin. Suez Environnement (France)

#### Footnote:

Application of Magnetite for Enhanced Biosorption Primary Treatment

S. Pattanayak, H. Ding, R. Wikramanayake, A. Erdogan. Siemens Water Technologies (Singapore)

#### Towards Energy Neutrality in Used Water Treatment: Results and Findings of Recent WERF Research

A. Shaw, S. Tarallo, P. Kohl, R. Eschborn, L. Fillmore. Black & Veatch (United States)

### Providing Affordable and Sustainable Wastewater Treatment through Optimal Technology Integration

D. Solley, S. Hu, C. Hertle, J. Keller. GHD Pty Ltd (Australia)

#### An Integrated Validation Plant Study Targeted towards Selecting Efficient Domestic Used Water Treatment Process for Future Water Reclamation Plant in Tuas

G. Tao, K. Kekre, Y. Lee, S. C. Chua, Y. L. Wah, Y. Abd Ghani, H. Seah. PUB (Singapore)

#### Case Study of Marquette-Lez-Lille WWTP – Application of IFAS and THP for a City of Future Solution

X. Zhao, M. Ji, M. Elliot, M. Gong, J. Li, J. Chauzy, X. Chen. Tianjin University / Veolia Water Solutions & Technologies Asia Municipal (China)

#### Influence of Wastewater Treatment on Sludge Production and Processing W. Barber. AECOM (Australia)

Thermal Conversion of Sewage Sludge in Energy: The Optimal Route to a Sustainable Solution for the Sewage Sludge Problem?

W. Rulkens. Wageningen University (Netherlands) Heating and Cooling Energy from Wastewater – New Income for Water Utilities N. Meeten, N. Hunt, A. Steinherr, D. Foster. HUBER (Germany)

Managing Risks in Advanced Wastewater Treatment Plants A. Hauser, K. Sathrugnan, F. Roedler. TUV SUD (Singapore)

#### The Role of Innovative Technologies in Achieving Energy Neutral Wastewater Treatment

J. Peeters, G. Vicevic, H. Koops. GE Water & Process Technologies (Canada)

#### Saving Energy by Optimisation of Air Distribution in Waste Water Treatment Plants

R. Binder. Binder Group AG (Germany)

#### Challenges in Variable Speed Wastewater Pumping S. Abelin. Xylem Water Solution (Sweden)

Sensor-Based Control – The Way for Energy-Efficient Open Channel UV System Operation M. Newberry. Wedeco (Germany)

#### Full-Scale Experiences with Aerobic Granular Biomass Technology for Treatment of Urban and Industrial Wastewater

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#### THEME 2B: ASSET MANAGEMENT & RESOURCE RECOVERY – EFFECTIVE AND EFFICIENT WASTEWATER MANAGEMENT

An Innovative Approach to Managing Sewage Quality in Metropolitan Melbourne L. Harvey, W. Douglass. Melbourne Water (Australia)

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#### Urban Drainage Modelling in the UK – Current State of Play and Looking to the Future

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J. Lahnsteiner, P. du Pisani, J. Menge, J. Esterhuizen. VA Tech Wabag GmbH (Austria)

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#### Innovative Top-Down and Bottom-Up City-Wide Implementation Strategies for Green Infrastructure

J. H. K. Quah, N. C. Tan, T. W. Lee, L. V. D. Tak, B. Marengo. CH2M HILL (Singapore)

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#### Water Safety Plans – A Catalyst for Ensuring Safe Water to Consumers in The Philippines

N. Hassan, D. Siru, A. Jayaratne, B. Magtibay. World Health Organization (Philippines)

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#### Isolation of Factors Governing Groundwater Salinisation along the Coastal Aquifers of South India Using Geochemical Tracers and Resistivity Methods

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#### THEME 5: WATER FOR INDUSTRIES

#### RO-EDR Hybrid System for High

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#### Distillation of High Concentrated Salt Solution by Memsys Membrane Distillation Module

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### Platform of On-Site Oxidant Generator for Water Treatment

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#### Potential Applications of Pepper Mottle Virus as an Indicator of Enteric Virus Removal by Treatment Processes and Fate in the Environment

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Privatisation of Domestic and Industrial Water Supply in Tamil Nadu, India – Lessons for Up-Scaling P. Kuppannan, N. B. V. Palanichamy. International Water Management Institute (India)

Proactive Residual Chlorine Control in a Water Distribution System D. Kim, I. Yeo, I. Hyun. Dankook University (Republic of Korea)

### Process and Engineering Design Considerations for Semiconductor Wastewater Recycling

J. Lander, I. Wang, M. Chan. Duraflow, LLC (United States)

Procurement and Commissioning of the 2nd and Largest Seawater Desalination Facility in Singapore S. V. Veerapaneni, M. Singaram, S. C. Tan, S. Saim, H. H. Ong, S. Venkataraman. Black & Veatch (United States)

Promoting Total Nitrogen Removal from Existing Aeration Basin using Entrapped Biomass Technology C. F. Lin, H. L. Ruan, H. Chen. National Taiwan University (Taiwan)

Protecting Lives in Hong Kong: a Novel Approach to Flood Risk Assessment – River Flood Risk Study K. Kwok, R. Roderick-Jones, S. Yan, F. Kan, E. Yuen, A. Fung. Ove Arup & Partners Hong Kong Ltd (Hong Kong)

#### Protozoon Classifications based on Biophysical Properties by Using On-Chip Immersion Refractometer

L. K. Chin, Y. Liu, L. Lei, S. Wee, T. C. Ayi, W. M. Ho, E. P. H. Yap, Y. Leprince-Wang, T. Bourouina. Nanyang Technological University (Singapore) PTFE-made Microfiltration Membrane for Produced Water Treatment and Oil Refinery Application

K. Ida, T. Morita. Sumitomo Electric Industries Ltd (Japan)

**PUB's Mobile Application: MyWaters** S. O. Fadzil. PUB, The National Water Agency (Singapore)

PumpWorX: A Proposed Pumping System Efficiency Index and System Classification Matrix – A Case Study L. Reynolds. AquamatiX Ltd (United Kingdom)

#### Pursuit of Ultimate Energy Efficient Reverse Osmosis Membrane for Seawater Desalination

T. Sasaki, J. Okabe. Toray Industries, Inc (Japan)

Q

#### Quality Characteristics of Groundwater in Tsunami Affected Coastal Areas of Sirkali Region of Nagapattinam District, Tamil Nadu, India R. Natarajamani. Annamalai University (India)

#### Quantitative Disease Risk Models for Wastewater Impacted Water During Floods

A. Erichsen, C. Joergensen, O. Mark, N. D. S. Domingo, G. Heinicke. DHI (Denmark)

Quest of Potable Groundwater in Arsenic Contaminated Geological Terrain and Role of Geogenic Control A. Mukherjee, S. Shekhar, A. Gupta. Upper Yamuna River Board (India)

### R

Radiological Monitoring of Boreholes in Abuja, North Central Nigeria O. Maxwell. Universiti Teknologi Malaysia (Malaysia)

#### Footnote:

RAMS for Improved Water Treatment Plant Reliability Against Minimum Costs R. Hoeijmakers, P. Ross. ARCADIS (Netherlands)

#### Rapid and Accurate Quantification of Antibiotic Biosynthetic Genes in Soil Microbial Community

T. H Le, G. Z. Zhou. National University of Singapore (Singapore)

Rapid and Sensitive Detection of Dibutyltin Dichloride in Water Samples R. Hu, L. Zhang. PUB (Singapore)

#### Rapid and Sensitive Detection of Human Astrovirus in Water Samples by Loop-Mediated Isothermal Amplification with Hydroxynaphthol Blue Dye

X. Q. He, B. Y. Yang. Beijing Forestry University (China)

#### Rapid and Specific Detection of Bacterial Targets in Water Based on Isothermal Amplification Assay

W. L. Teng, A. M. Binte Anwar, S. Y. Chang, M. V-M Wong, T. T. Lim, M. Savill. PUB (Singapore)

#### Rapid Determination of Biological Activity in Drinking Water Using Second Generation ATP Test Kit L. Yu, H. Zhang, P. Gao, C. H.Woo. PUB (Singapore)

#### Real-time Monitoring of Ozonation through On-line Estimation of Ct Value and AOC Formation

P. Ross, A. V. D. Helm, J. V. D. Broeke, L. Rietveld. Delft University of Technology (Netherlands)

#### Real-Time Optical Sensing Device for in Situ 3D Chemical Mapping

C. L. Ng, S. Senft-Grupp, H. Hemond. Singapore-MIT Alliance for Research and Technology Centre (Singapore) Recommendations for Initial Non-Revenue Water Assessment R. Liemberger. Miya Philippines (Philippines)

#### Reconciling the Expanding Water Needs of Cities and Agriculture in a World of 9 Billion

D. Percy. Faculty of Law, University of Alberta (Canada)

#### Reducing Risk in Desalination Plant Development through Lean Construction J. Renner. Victaulic (United States)

J. Renner. Victaulic (United States)

#### Reducing SWRO Life Cycle Costs by Direct Coupling of UF and SWRO Systems

F. Knops. Pentair X-Flow (Netherlands)

### Regulatory Audits of Water Safety Plans – a Practical Experience in Developing Strategies and Tools

P. Joshi, C. H. Chan, W. K. M. Ho, J. L. T. Tng. National Environment Agency (Singapore)

#### Removal of Cadmium by Activated Carbons Produced from Waste Rubber

V. Gupta, T. Saleh, A. Saadi. IIT Roorkee (India)

#### Removal of Heavy Metals by Using Cement Kiln Dust

M. Zayat, S. Elagroudy, S. E. Haggar. The American University in Cairo (Egypt)

#### Removal of Perfluorinated Compounds from Water Using Nanoscale Zero-Valent Iron

A. S. Stasinakis, O. S Arvaniti, H. R Andersen, Y. Hwang, N. S Thomaidis. University of the Aegean (Greece)

#### Removing Pharmaceuticals and Potent Compounds from Industrial Wastewater

M. DeMarco, E. Helmig, J. Rushing, P. Ross. ARCADIS (United States)

#### Removing Water Hyacinth on Lake Victoria as Strategy for Better Water Quality and Health Improvement A. Namuli. MWODA (Mitukula Women's Development Association) (Uganda)

#### Renewable River Energies for Pollution Management in River Ganga at Varanasi

U. K. Choudhary, A. K. Singh, R. Jha. MMIT Varanasi (India)

#### Reverse Osmosis Membranes for Ethanol Enrichment

M. T. Nguyen, W. M. Samhaber. Hanoi University of Science and Technology (Vietnam)

#### Reversing Clogging in Imhoff Tank by Catalysed Hydrogen Peroxide Treatment B. S. Lee. Indah Water Konsortium (Malaysia)

Riyadh Water Supply Programme – Success in Fast-Track Delivery D. Jones, A. Al-Mansour. AECOM (Saudi Arabia)

#### Robust and High Performance Hollow Fiber Membranes for Pressure Retarded Osmosis Process R. Wang, S. Chou, T. Fane. Nanyang

Technological University (Singapore)

#### S

#### Saving Energy and Optimising Operations Using Real-Time Pump Scheduling

D. Thomas, S. Mishra, J. Little, W. Spittal, S. Jobson, B. Wan. AECOM (Canada)

#### Screening Large Areas for SUDS Using a GIS Approach for Multi-Purpose Improvements in Efficiencies Z. Todorovic, N. Breton. Atkins (United

Kingdom)

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# Screening of Bio-Active Molecules in Wastewater and Sludge

A. Bruchet, N. Noyon, S. Besnault, M. J. Capdeville, C. Miege. Suez-Environnement, CIRSEE (France)

#### Seawater Desalination -

Lesson from Euryhaline Fish Q. Lin, S. H. Lam, Z. Li, Y. K. A. Ip, T. J. Lam, C. N. Ong, D. Yang. National University of Singapore (Singapore)

#### Security by Design for Water Facility

C. Liu, T. S. Lok. K&C Protective Technologies Pte Ltd (Singapore)

#### Semizentral Germany – Integrated Infrastructure Solutions for a More Resilient Future of Fast Growing Urban Regions

S. Bieker, P. Cornel. Technische Universität Darmstadt (Germany)

### Sensors and Strategies for Safe and Secure Potable Water

I. Pepper, S. Sherchan, H. W. Yu, S. Snyder. The University of Arizona (United States)

### Sensors for Fouling Control of RO Membranes

A. G. Fane, L. N. Sim, A. H. Taheri, J. Gu, S. T. V. Sim, T. H. Chong, A. Yeo, H. G. L. Coster, W. B. Krantz. Nanyang Technological University (Singapore)

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A. Verma, S. Suresh, M. Joshi. General Electric India Technology Centre (India)

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R. Huang, A. Soh, W. M. Lee. LiqTech Pte Ltd (Singapore)

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#### Soft Infrastructures for Flood Risk Management in Dar Es Salaam and Copenhagen

P. Mguni, M. B. Jensen, L. B. Herslund. University of Copenhagen (Denmark)

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Indicators onto Tropical Soil F. Mahsa, N. H. Tran, J. Hu, S. L. Ong. National University of Singapore (Singapore)

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J. Huang, V. P. Chua, X. Zhang. National University of Singapore (Singapore)

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R. Weiss. Endress+Hauser Flowtec AG (Switzerland)

#### Strategic Directions for Water Utilities in the United States: Insights and Perspectives for Global Utilities C. Wallis-Lage. Black & Veatch (United

States)

#### Study Of Double Breakpoints During Chlorination Of River Yamuna Water, Delhi (India)

L. Kumar. Delhi Jal Board, Government Of NCT Delhi (India)

#### Study of Water Quality in a Tropical Pond in Singapore U. Joshi. National University of

Singapore (Singapore)

#### Study on the Relationship between the Treatment Ability of Sewage and the Biochemical Characteristics of Dominantly Growing Bacteria in Sewage Treatment Plant

B. S. Lee. Indah Water Konsortium Sdn Bhd (Malaysia)

### Study on the Strategy for Promotion of Water Reuse in Taiwan

Y. P. Lee, H. L. Juan, S. J. Liu, W. F. Yu. Chung Yuan Christian University (Taiwan)

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L. Q. T. Nguyen, M. Engelhart, M. Wagner, P. Cornel, V. A. Nguyen. IWAR, Darmstadt Technical University (Germany)

#### Superior Performance of Immersed UF for RO Pre-Treatment on a Middle-East Tertiary Application

M. Blazevski, K. Mende, B. Khader, J. Cadera, E. Schoepke, A. B. H. Hamida. GE Water and Process Technologies (Canada)

#### Surface Interaction Controlled Limiting Flux Phenomena for Colloidal Fouling

C. Tang. The University of Hong Kong (Hong Kong)

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Sustainability Assessment for the Yellow River: Engaging Stakeholders in Integrated Water Resources Management H. Wu. University of Oxford (United Kingdom)

#### Sustainability Assessment of Centralised and Dual Water Distribution System

N. Y. Aydin, T. Schmitt. University of Kaiserslautern (Germany)

#### Sustainable Clean Water Access: Role of Union of Community Development Volunteers (UCDV)

J. Buganga. Makerere University (Uganda)

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D. Gregory, J. Pruss, P. Dennis. Seqwater (Australia)

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#### Sustainable Water Resources Management in Arid and Semiarid Regions of the World: A Case Study in Iran

N. T. Shirazi, G. Azizyan. International Campus of University of Sistan and Baluchestan (Iran)

#### Sustainable Water Supply to Port Blair Town, Andaman Island, & India, with Special Reference to Inter Island Transfer of Spring Water

A. Kar. Central Ground Water Board (India)

#### Sustainable Water Supply by Using Native Sources in Haveri Town: A Case Study from India

J. Divakaran, K. T. Perumal. CDM Smith India Private Limited (India) SWRO Brine with Wastewater B. Liberman. IDE Technologies (Israel)

Sydney Desalination Plant Mothballing – the Project, Challenges and Lessons Learnt G. Ovens, S. Bahl, A. Lagny. Sydney Desalination Pty Ltd (Australia)

#### Synthetic Greywater Treatment Using Zero-Valent Iron-Based Fenton-Like System

S. N. Zhu, D. Tsang. Hong Kong Polytechnic University (Hong Kong)

#### System to Maintain Dissolved Oxygen Levels in Gowanus Canal, New York City

D. Clidence. ECO Oxygen Technologies, LLC (United States)

#### Т

#### Tampa Bay Sea Water Desalination Facility Optimisation (First Years of Operation 2007-2013)

P. Miranda, A. Martorell, E. Palacios. Acciona Agua (Spain)

#### Technical Solution to Prevent Build-Up of Lime Deposit in the Lime and Carbon Dioxide Dosing System K. A. Ong, O. K. Lim, P. C. Koh. PUB Singapore (Singapore)

#### Technological Advances in the Permanent Monitoring of Large Diameter Transmission Mains for Leakage and Transients M. Bracken. Echologics (Canada)

Technology Developments in Forward Osmosis to Address Water Purification J. Webley. Trevi Systems Inc. (United States)

The Application of Appropriate Technology for Water Distribution System Planning in Developing Areas L. Geustyn, K. Kinsbergen, T. Rust. GLS Consulting (South Africa) The Benefits of Enhanced and Accelerated Biological Monitoring Capabilities for Membrane Treatment P. Whalen, D. Tracey. LuminUltra Technologies Ltd. (Canada)

The Causes and Solutions of the Secondary Water Supply Management Problem S. Shu, X. Zheng. NERC (China)

The Challenge of Improving Urban Water Services: Evidence from Performance-Based Contracts in India O. Jensen. Global Water Intelligence (Singapore)

### The Effect of NOM Character on the Ozonation of Geosmin

J. Wun Kang, S. Kim, Y. Yoon, Y. Ahn, B. Hun Jeon. Yonsei University (Republic of Korea)

#### The Effects of Biomass and Temperature on Maximum Ammonia Oxidation Rate in Wastewater Treatment S. Wang, Y. Zhang. Beijing University of

Technology (China)

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L. B. Sing. Indah Water Konsortium Sdn Bhd (Malaysia)

The Goldfields Water Supply, 100 Years+ C. Stone. Acciona Agua Australia Pty Ltd (Australia)

#### The Integrated Approach to Enflo-Daf™ Design for the 21st Century T. Amato. Doosan Enpure Ltd (United Kingdom)

The Planning, Design, & Construction of Thames Water's Lee Tunnel Project, London R. Sutherden, R. Mitchell. AECOM (United Kingdom)

#### Footnote:

#### The Power of Social Norm & Information-Based Efficiency **Programs to Reduce Residential Water** Use in California

P. Yolles, D. Brent. WaterSmart Software (United States)

#### The Practice of Control Non-Point Source Pollution by Soil and Water Conservation Measures in Northeast, China

L. Meng, B. Yan. Songliao Water Resources Commission (China)

#### The Process Performance and Fate of Boron in a Multi-Stage **Forward Osmosis Process for Integrated Water Management**

Z. Li, R. V. Linares, M. Abu-Ghdaib, G. Amy. King Abdullah University of Science and Technology (Saudi Arabia)

#### The Regulation of Shenzhen River Stage IV Jointly by Shenzhen and Hong Kong

W. H. Luk, A. Kwok. Drainage Services Department (Hong Kong)

#### The Sustainability of Water Supply -Desalination and Alternatives in the **Tropics: US Virgin Island**

H. Minnigh, G. Ramirez, H. Mark, M. Diaz, A. Lewis. Gabriella and Paul Rosenbaum Fdn (Puerto Rico)

#### The True Cost of Water – Monetising Water Risks and Engaging the **Financial Community** J. Clere, C. Dupont. Veolia Water (France)

#### The Use of MBR Systems in Breweries and Beverage Industry – Maximum "Purity" of Even Wastewater T. Hackner, S. Meuler, F. Heindl, H. L.

**Ooi. HUBER SE (Germany)** 

Three Decades' Operational **Experience of Acid Treated MSF Desalination Plants: A Case Study** G. Ozair, Y. A. A. Ayed, M. O. A. Feda. Power & Water Utility Company (Marafiq) for Jubail & Yanbu (Saudi Arabia)

To the Water Delivery Problems from Toktogul Reservoir to the River Syrdarya Lower Reaches and the Northern Small Aral Sea Y. Popov. Ecotera Ltd. (Kazakhstan)

#### **Towards Sustainable Municipal** Water Services in South Africa: Harnessing Local Government Vulnerability Self-Assessment G. Mackintosh, A. Wensley, F. Stevens. Emanti Management (South Africa)

Toxicity of Arsenite and Arsenate in the Denitrifying Bacteria S. R. Panthi, T. Thompson. WHO Nepal (Nepal)

#### Trace Boron Analysis in NEWater and Other Water by Plasma-Based **Spectrometric Methods** W. N. Yap, K. Y. Lim, Y. Liu, Z. Guo. PUB (Singapore)

#### Treatment of Artesian Well Water with **High Manganese Concentration**

A. Perfilev, A. Chirikov, A. Yudakov, Y. Badulin, V. Slesarenko, D. Chervonetskiy. Institute of Chemistry, Far-Eastern Branch of Russian Academy of Sciences (Russian Federation)

### Treatment of Blue Algae Bloom Using a Mobilised Electrochemical AOP Pilot Platform in Lake/Reservoir

Y. Li. Haohan Tsinghuaer Technology Technology (Group) Co. Ltd. (China)

#### **Treatment of Hospital Wastewater by** MBR Followed by Ozone and GAC

U. Nielsen, C. H. Hauerberg, M. M. Klausen, J. Søholm, J. Tuerk. DHI (Denmark)

#### Treatment of Landfill Leachate with Membrane Technologies F. Li. Rochem UF-Systeme GmbH (Germany)

U

**Underground Spaces – Practical** Experience and Lessons Learnt on Benefits and Limits for a **Sustainable Alternative to** Aboveground Developments C. Simmermacher. CH2M HILL (Singapore)

Urban Harvest: Quantification of **Innovative Water Technologies & Concepts for Improved Water Cycles** I. Leusbrock, C. Agudelo, K. Keesman, G. Zeeman, H. Rijnaarts. Wageningen University (Netherlands)

### Using Key Performance Indicators to **Deliver a Successful Municipal Capital** Improvement Programme

E. Adams, L. Ramirez, M. Palaviccini, R. Frias, CDM Smith (Puerto Rico)

#### Using the Smart Grid for Water to Future-Proof Our Utilities and Cities

G. Symmonds, T. Hill. Global Water **Resources (United States)** 

#### Utilising a Water Smart Grid for Operational Benefit and System Resiliency

R. Kadiyala, C. Newberry. CH2M HILL (United States)

#### UV Disinfection of Raw Surface Water to Provide Backup Drinking Water Supply

C. Scurtu, C. Senstad, A. Nebelung, L. Hem. Oslo Water and Sewerage Works (Norway)

#### V

### Vacuum Membrane Distillation for High Saline Water Treatment

S. Jeong, G. Naidu. University of Technology, Sydney (UTS) (Australia)

#### Victorian Desalination Plant: Successful Fast-Track Commissioning and Operational Start-Up of the World Largest SWRO

M. Sanz, P. Mazounie, V. Bonnelye. Degrémont (France)

#### Vision for the Australian Water Industry Till 2030

S. Wilson, A. Lovell. Water Services Association of Australia (Australia)

#### W

#### Waste-to-Value: Converting High Chlorine Wastewater to Usable Chemistry T. Muilenberg. MIOX Corporation

(United States)

#### Wastewater Pump Clog Resistance Cannot be Determined by Throughlet Size

S. Abelin, M. Karlen. Xylem Water Solution (Sweden)

#### Wastewater Reuse: Managing Salinity Issues in Agricultural Irrigation N. Kathijotes. Cyprus University of Technology (Cyprus)

#### Wastewater Treatment and Recycle: an Overview of the Effluent Treatment/Water Recovery Plant for a Petrochemical Plant, India

K. P. Yagna, R. Harish. VA Tech Wabag Ltd (India) Wastewater Treatment of Dairy Factory by Using Submerged Membrane Microfiltration Process A. Alsaffar, A. Al-Sairafi, M. Salman. Kuwait Institute for Scientific Research (Kuwait)

#### Water Accessibility to Rural Communities in Kampong Cham and Banteay Meanchey Provinces of Cambodia P. Kapoor, R. K. Gupta. WAPCOS

Limited (India)

#### Water and Health Status in Tamil Nadu N. Perumalsamy. Yadava College Madurai (India)

#### Water Conservation Concern in Yogyakarta Destination, Indonesia A. Suyanto. Yogyakarta School of Environmental Engineering (Indonesia)

Water Conveyance by Tunnelling D. Ifrim, D. Zoldy. AECOM (Canada)

#### Water Loss Component Analysis Used for Setting Economic Targets M. Nicol, J. Thornton. Echologics (Singapore)

#### Water Quality Monitoring – Turning Data from Online Sensors into Information

F. Edthofer, A. Weingartner, J. V. D. Broeke, K. Thompson. S::can Messtechnik GmbH (Austria)

#### Water Quality Sensors Network Return of Experience

C. Lemoine, P. Wolfe, T. Fer. Veolia Water Solutions & Technologies (Singapore)

#### Water Quality Studies on Viruses and Bacteria in Ballast Water Using Metagenomics

Y. Kim, T. Aw, J. Rose. Michigan State University (United States)

#### Water Requirements, Supply, Consumption and Disposal for Dairy Industry B. Fatima, F. E. A. Afridi. Government of Pakistan (Pakistan)

31

### Water Safety Planning Cycle – Closing the Loop

J. Williamson, K. Macleod. Canterbury District Health Board (New Zealand)

Water Safety Plans H. Singh. Fiji National University (Fiji)

#### Water Supply Optimisation through Integrated Water Resource Management Methods G. Garcia, G. Bravo. Abeinsa Business

Development (Spain)

#### Water/Wastewater/Stormwater Infrastructure Resilience – Key Learned Lessons from the Christchurch Earthquake Sequence G. Macdonald, D. Hunt, D. Heiler, G. Offer. Beca Ltd (New Zealand)

Water: New Approach in the Challenges of Security Policy S. Sandor. Embassy of Hungary in Singapore (Singapore)

#### Watering the Globe – MBBR/IFAS Provides Enhanced Removal Efficiency for Upgrading Decentralised STP C. Rapheal. Headworks USA (United Arab Emirates)

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EARLY BIRD REGISTRATION (ENDS 31 MARCH 2014)	тіск	FULL RATES (FROM 1 APRIL 2014)	тіск			
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\$1,280		\$1,440				
\$1,120		\$1,280				
\$960		\$1,120				
\$800		\$800				
\$640		\$800				
		\$1,600				
	\$1	50				
3 JUNE 2014 [ ] 4 JUNE 2014 [ ]						
\$630		\$700				
\$560		\$630				
\$490		\$560				
	\$1,440 \$1,280 \$1,120 \$960 \$800 \$640 2014 [ ] \$630 \$560	(ENDS 31 MARCH 2014)   \$1,440   \$1,280   \$1,280   \$1,280   \$1,20   \$960   \$800   \$640   \$640   \$1   \$640   \$640   \$640	(ENDS 31 MARCH 2014) (FROM 1 APRIL 2014)   \$1,440 \$1,600   \$1,280 \$1,440   \$1,280 \$1,440   \$1,120 \$1,280   \$960 \$1,120   \$800 \$800   \$640 \$800   \$1,600 \$1,600   \$1,120 \$1,120   \$800 \$1,120   \$2014 [ ] \$100   \$560 \$630			

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100

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### PUB, SINGAPORE'S NATIONAL WATER AGENCY

#### About PUB, the national water agency

PUB is a statutory board under the Ministry of the Environment and Water Resources. It is the national water agency that manages Singapore's water supply, water catchment and used water in an integrated way.

About PUB's tagline: Water for All: Conserve, Value, Enjoy PUB has ensured a diversified and sustainable supply of water for Singapore with the Four National Taps (local catchment water, imported water, NEWater, desalinated water).

To provide water for all, PUB calls on all to play our part to conserve water, keep our water catchments and waterways clean and build a relationship with water so we can enjoy our water resources. If we all play our part, we can have enough water for all our needs – for industry, for living, for life. LEE KUAN YEW WATER PRIZE SPONSOR:



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