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With a worldwide installed base approaching 20,000 systems, we continue to set the standard as an industry-leading membrane system provider. Our solutions are at work today in a wide variety of markets that include municipal and industrial water and wastewater processing; dairy, juice, and wine processing; industrial biotechnology; and many more. We help thousands of industries reduce their water footprint, increase productivity, and reduce costs.

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#### Gala dinner sponsor

**PWN Technologies**

PWN Technologies (PWNT) is a full subsidiary of water utility PWN. PWN already had a track record and well known reputation of 96 years innovative effective and sustainable solutions in water treatment. In 2009, PWNT was founded to make these technologies available globally. The revenues of PWNT are invested in new R&D programmes to develop new solutions on surface water treatment. The R&D center, established in Andijk, was extended in 2012 and can be considered as one of the largest R&D centers in the world, where state of the art water solutions are developed. These technologies are highly reliable, have very low life cycle cost and a small footprint compared with conventional technologies.

PWNT has been assigned to build a 180 MLD CeraMac® (ceramic membrane microfiltration) water treatment plant for PUB at Choa Chu Kang Waterworks (CCKWW) in Singapore, after a successful pilot of 18 months. This plant will be operational in 2018.

In the UK, PWNT has been assigned to build the new North Plymouth Water Treatment Works for South West Water, that will have a capacity of 90 MLD and combines suspended ion exchange (SIX®), inline coagulation adsorption and (ILCA®) and CeraMac®. It will replace the existing Crownhill Water Treatment Works and will be operational by the end of 2018.

[go to pwntechnologies.com](http://pwntechnologies.com)

#### Welcome reception sponsor

**Ostara**

Ostara helps protect precious water resources by changing the way cities around the world manage nutrients in wastewater streams. The company’s Pearl® technology recovers phosphorus and nitrogen at municipal and industrial wastewater treatment plants and transforms them into a high-value, eco-friendly fertiliser, Crystal Green®. The process greatly reduces nutrient management costs and helps plants meet increasingly stringent discharge limits while improving operating reliability.

Crystal Green is the first continuous release granular fertiliser to provide Root-Activated™ phosphorus, nitrogen and magnesium (5-28-0-10Mg), and is marketed through a global network of blenders and distributors to growers in the turf, horticultural and agriculture sectors. Its unique Root-Activated™ mode of action improves crop yields, enhances turf performance and significantly reduces the risk of leaching and runoff, thus protecting local waterways from nutrient pollution. Ostara operates multiple facilities throughout North America and Europe. For more information, visit [www.ostara.com](http://www.ostara.com) and [www.crystalgreen.com](http://www.crystalgreen.com)

[go to ostara.com](http://ostara.com)

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**Grupo Aguas de Valencia**

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**Acciona**

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**Bilfinger Berger**

**Daneva**

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### Exhibitors

**Koch Membrane Systems**

**Evoqua**

**Esri**
The Leading Edge Technology conference (LET) is devoted to innovation in the field of water technology, allowing us to bring research and development to rapid practical application. This IWA initiative improves the instruments for water management, and widens their scope – with a focus on integrating urban water systems and river basins.

By bringing together leading researchers, technologists and water managers from all over the globe and enhancing co-operation, a considerable contribution is made to providing safe water for everybody. As it becomes clear that traditional approaches are no longer adequate to deal with water availability in the face of a growing population and urbanisation in many regions, new and more efficient methodologies for water management methods are necessary to solve the increasingly pressing environmental problems.

LET is an IWA “think tank” to develop solutions to these challenges, and combines the ideas and results of leading scientists with water industry practitioners, connecting the global with the local.

LET fosters new and ground breaking ideas, and their integration into practical progress – re-shaping the future. This conference attracts all those who need to protect water resources and provide environmental services, anticipating future developments for the water sector.

The 2016 LET taking place in Jerez, Spain – after 2015 in Hong Kong, and 2014 in Abu Dhabi – complements the technological approaches of urban water management between megacities, smaller towns and rural environments, driven by the diversity of climatic conditions and the natural and human environments.

Jerez is in the province of Cadiz, from where Columbus sailed 500 years ago. This city was selected to provide the bridge towards the Americas, and to attract experts from the Mediterranean region, which is facing great water challenges – and showcases the integration of water between agriculture and cities. Come and have a taste of it at LET 2016.

Helmut Kroiss
IWA President

Access to affordable and safe water is a great global challenge, and with growing population and urbanisation, only emerging new approaches can make cleaner water more accessible to all people, while maintaining the natural balances of ecosystems. This is even more evident in water-scarce areas like Southern Spain.

The Programme Committee relies on your participation at and input to this conference, the 13th of a series that we started in Noordwijkerhout, Netherlands, in 2003. This exceptional event attracts leading water professionals and scientists from all over the world.

Your contribution – as speakers and attendees – ensures that LET keeps its characteristics: the highest quality for scientific content, the most impact of technical developments, the most intense interchange of personal and professional opinions – bridging the gap between academia and practice. Indeed, the LET is famous for offering top notch water technology and the most active network of managers looking proactively for solutions.

Following previous LET conferences, the event will cover both local and international themes. The Programme Committee selects recognised world leaders to anchor each topic, complemented by platform speakers and poster presenters from a highly competitive call. Only peer reviewed contributions are accepted to maintain high quality and consistency, and yield a productive debate.

I welcome each of you to the 2016 LET in Jerez – where water is crucial to achieve the first miracle and produce spectacular wines. This will allow a stimulating and invigorating exchange on many innovative ideas and solutions developed in the area and worldwide – as it is from here that the explorers started to discover the new world.

Mark van Loosdrecht
Chairman Programme Committee
TU Delft, Netherlands

As president of the Spanish Association of Water Supply and Sanitation (AEAS) it is my pleasure to introduce this event. Spain is among the European countries that suffers a higher water stress. Perhaps that is why Spanish people are in the group of citizens who consume resources in a more responsible way, in terms of per capita consumption. Currently, the average household consumption is 135 liters per day, which is 10% less than 2012: Spain is a country with a significant water culture. Despite this high degree of public awareness, our country also faces important challenges in water management: first, renewing infrastructure, resulting from several lean years in government investment.

Another challenge is the one which refers to the adequacy of tariffs, currently do not cover all the costs of the service and, therefore, do not guarantee the future sustainability of the system; and the need to address certain legislative changes that endow the homogenisation and greater transparency sector are good examples of the importance of what remains to be done.

One of the most interesting tools that the sector of water management has at its disposal to maintain the excellence of the services is international cooperation. It is precisely at this point where events such as the IWA Leading Edge Technology Conference can serve as change to stimulate a culture of continuous improvement. Scientists, experts, governments, companies and organisations of all kinds will find in Jerez an interesting forum for exchanging ideas and opinions.

When, after the Congress, each participant returns home, they will do it with a valuable store of knowledge and experience with which to successfully undertake the challenges that we daily encounter in the management of our most vital resource: Water.

Fernando Morcillo
Chair of the Organising Committee
AEAS, Spain
LET2016 CONFERENCE PROGRAMME

Sunday, 12 June 2016

16:00
Registration opens – Venue: Hotel EXE Guadalete. Avda. Duque de Abrantes, 84. Jerez de la Frontera

Monday, 13 June 2016

09:00

10:00

10:00

Workshop 1: Challenges, Opportunities and Barriers for Decentralised Treatment of Wastewater
Room: Giralda

Workshop 2: Resilient Cities
Room: Torre del Oro

Workshop 3: Overcoming Barriers of Anaerobic Membrane Bioreactor (AnMBR) Technology: Moving from Wastewater Treatment Plants (WWTPs) to Water Resource Recovery Facilities (WRRFs)
Room: Guadalete

11:45 – 12:15
Morning Break

12:15

12:15
Workshop 1 – Part 2
Workshop 2 – Part 2
Workshop 3 – Part 2

13:30 – 15:00
Lunch

Workshop 4: The Future Is Here: Experiences in the Full-scale Implementation of Mainstream Deammonification for Leading Edge Nitrogen Control
Room: Guadalete

Workshop 5: Development and Application of Sustainable Membrane Desalination Technology: Reversing Water Scarcity and Fast Forwarding to the Future
Room: Torre del Oro

Workshop 6: Microalgae Based Wastewater Treatment Facilities: Progress, Experiences and Perspectives for the Next Years
Room: Giralda

15:00

15:00

16:40 – 17:00
Afternoon Break

17:00
20:30

Welcome Reception at Cloister of Santo Domingo (Sponsored by OSTARA)
Venue: Alameda Marqués de Casa Domecq, 4, 11402 Jerez de la Frontera, Cádiz, Spain

Registration opens – Venue: Hotel EXE Guadalete. Avda. Duque de Abrantes, 84. Jerez de la Frontera

09:00
Registration opens – Venue: Hotel EXE Guadalete. Avda. Duque de Abrantes, 84. Jerez de la Frontera

16:00
Registration opens – Venue: Hotel EXE Guadalete. Avda. Duque de Abrantes, 84. Jerez de la Frontera

09:00
Registration opens – Venue: Hotel EXE Guadalete. Avda. Duque de Abrantes, 84. Jerez de la Frontera

16:00
Registration opens – Venue: Hotel EXE Guadalete. Avda. Duque de Abrantes, 84. Jerez de la Frontera
Workshops details:

**Workshop 1: Challenges, Opportunities and Barriers for Decentralised Treatment of Wastewater**

**Organiser:** Juan M. Lema. University of Santiago de Compostela. Coordinator of Novedar Network

Novedar Network (www.novedar.com)

**Objective:** The objective of the workshop is to analyse the real opportunities of the concept of decentralised treatment of wastewater, including source separation, as an alternative to the centralised option. Four specialists will deal with the strategy, the available technology and the points of view from companies and water authorities. There will be an extended debate between the speakers and the attendees in which everyone could get their own conclusions.

- **10:00** Presentation of the workshop
  The 3R concept in wastewater treatment
  Juan M. Lema. University of Santiago de Compostela, Spain

- **10:15** The role of decentralised systems in the new water management paradigms
  Manel Poch, University of Girona, Spain

- **10:45** Source separation of domestic waste (water) for energy efficient recovery of resources.
  Grietje Zeeman. Wageningen University& Research, Netherlands

- **11:15** Decentralised systems: New opportunities for the city of tomorrow?
  Carlos Campos. CIRSEE. Suez-Environement, France

- **11:45** Coffee break

- **12:15** The point of view of Water Authorities
  Carlos Aragón. CENTA, Spain

- **12:45** Discussion

**Chair:** Juan M. Lema, University of Santiago de Compostela, Spain

**Workshop 2: Resilient Cities**

**Organiser:** Xavier Aldea, Cetaqua Water Technology Center, Spain

**Objective:** The objective of the workshop is to analyse opportunities in the application of technologies to improve urban resilience from an urban water cycle perspective. Several specialists will present the main challenges in urban resilience, its relationship with the urban water cycle, what kind of strategies can be implemented, and an application example in a Mediterranean city. In the round table, we expect to debate, within the previously presented framework, what kind of technological solutions can bring answers for the urban water cycle.

- **10:00** Welcome and workshop presentation
  Xavier Aldea. Cetaqua Water Technology Center, Spain

- **10:10** Introduction to resilience in urban environments: future challenges
  Youssef Diab. École des Ingénieurs de la Ville de Paris, France

- **10:30** The role of the urban water cycle in urban resilience: Main associated challenges.
  Xavier Aldea

- **10:50** Implementation of strategies for improving urban resilience in a climate change context
  Marc Velasco, Suez Water Advanced Solutions

- **11:10** Urban resilience plans: Application example in a Mediterranean city
  Alexandra Figueira, Lisboa City Council, Portugal

- **11:30** Questions

- **11:45** Coffee break

- **12:15** Round table: Technology application to improve resilience in cities
  Chair
  Xavier Aldea

**Participants**
Youssef Diab; Marc Velasco; Alexandra Figueira; Fernando Delgado, University of Granada, Spain; Simon Púlido, Aguas de Huelva, Spain

- **13:00** Discussion

- **13:15** Closing words
  Matilde Mancha. Hidralia, Spain
### Workshop 3: Overcoming Barriers of Anaerobic Membrane Bioreactor (AnMBR) Technology: Moving from Wastewater Treatment Plants (WWTPs) to Water Resource Recovery Facilities (WRRFs)

**Organiser:** Ángel Robles, Universitat Politècnica de València, Spain  
Emérita Jiménez, FCC Aqualia, S.A., Spain

**Objective:** Identifying and evaluating the key operating issues limiting the widespread application of Anaerobic Membrane Bioreactor (AnMBR) Technology for Wastewater Treatment.

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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</table>
| 10:00 | Welcome Remarks and Workshop Chartering  
Ángel Robles (Workshop Co-Chair); Emérita Jiménez (Workshop Co-Chair) |
| 10:15 | Feasibility of Anaerobic Fluidised Bed Membrane Bioreactors (AFMBR)  
Jaeho Bae, Inha University, South Korea |
| 10:25 | Membrane Fouling and Mitigation Strategies  
David C. Stuckey, Imperial College London, United Kingdom |
| 10:35 | Capex reduction? Dynamic membranes using filtration cloths  
Jules van Lier, Delft University of Technology, Netherlands |
| 10:45 | Life Cycle Analysis of Different AnMBR-based WWTP Configurations  
Ángel Robles, Universitat Politècnica de València, Spain |
| 10:55 | Panel discussion with Audience Participation  
**Moderator:** Frank Rogalla, FCC Aqualia, S.A. |
| 11:45 | Coffee Break |
| 12:15 | Discussion panel 2: Maximising Membrane Filtration and Bioreactor Performance in Anaerobic Membrane Bioreactors (AnMBRs) for Wastewater Treatment  
Submerged Anaerobic Membrane Bioreactor Process  
Mario Rizkallal, Kubota |
| 12:25 | Implementation of a Demonstration-scale Submerged AnMBR for Urban Wastewater Treatment  
Emérita Jiménez |
| 12:35 | AnMBR, from Concept to Full-scale  
Reuben Bouman, Biothane Leading Anaerobic Technologies, Netherlands |
| 12:45 | Implementing a Full-scale Facility Based on the Combination of Ceramic MBR and UASB Process  
Guipe Tao, PUB, Singapore’s National Water Agency, Singapore |
| 12:55 | Panel discussion with Audience Participation  
**Moderator:** Adam Smith, University of Southern California, USA |

### Workshop 4: The Future is Here: Experiences In the Full-Scale Implementation of Mainstream Deammonification for Leading Edge Nitrogen Control

**Organiser:** Dr. Julian Sandino, CH2M  
Dr. Jose Ramon Vazquez, FCC Aqualia, S.A.

**Objective:** Learn from those directly involved in the full-scale implementation of mainstream deammonification of aspects related to process fundamentals, alternative technology approaches, and most importantly, the lessons learned from the design, procurement and operation of these systems.

<table>
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<tr>
<th>Time</th>
<th>Session</th>
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| 15:00 | Welcome Remarks and Workshop Chartering  
Julian Sandino (Workshop Co-Chair); Jose Vazquez (Workshop Co-Chair) |
| 15:15 | Process fundamentals of mainstream deammonification  
Jose Vazquez |
| 16:00 | Approaches to mainstream deammonification (different process sheets): DEMON, ANITA Mox, ANAMMOX, ELAN  
Julian Sandino, CH2M |
| 16:40 | Coffee Break |
| 17:00 | Alternative evaluation, facility design and technology procurement considerations in the full-scale implementation of mainstream deammonification  
- What issues utilities face when determining whether to implement and how  
- Case studies: Odense, Denmark; Alexandria, VA, USA; Tilburg, Netherlands  
Tim Constantine; Per Henrik Nielsen; Jan-Evert Veldhoven |
| 18:00 | Large-scale prototype experiences  
- Sjölunda WWTP, Malmo  
- Rotterdam-Dokhaven WWTP  
- Mainstream ELAN® process – Industrial WWTP  
David Gustavsson; Tim Hendrickx; Jose Vazquez |
| 18:30 | Panel discussion with Audience Participation: Knowledge gaps and remaining challenges for accelerating adoption of mainstream deammonification  
Tim Constantine; David Gustavsson; Tim Hendrickx; Per Henrik Nielsen; Jan-Evert Veldhoven |
Workshop 5: Development and Application of Sustainable Membrane Desalination Technology: Reversing Water Scarcity and Fast Forwards to the Future

Organiser: Marina Arnaldos Orts, ACCIONA Agua SAU

Objective: Discussing potential innovations to enhance sustainability in conventional desalination systems, as well as sharing pilot experiences with emerging technologies

15:00 Welcome Remarks and Workshop Chartering
- Introductions and agenda review
- Defining expectations from participants
Domingo Zarzo, AEDyR (Workshop Co-Chair); Marina Arnaldos, Acciona Agua (Workshop Co-Chair)

15:10 Initial Questionnaire Through Real-Time Voting System

- Q&A
Marina Arnaldos, Acciona Agua

15:45 Energy Efficient Desalination of Industrial Wastewater: Case Study
- Q&A
Sebastien Logette, Solvay

16:10 Energy Improvements in Reverse Osmosis Desalination Systems through Innovation and Optimization of Individual Equipment
- Q&A
Rafael Ramos, Danfoss

16:40 Coffee Break

17:00 Hybrid Forward Osmosis – Membrane Distillation Processes for Sustainable Desalination and Wastewater Recovery: Opportunities and Challenges
Rodrigo Valladares Linares, Rotoplas / King Abdullah University of Science and Technology (KAUST)

17:30 Feasibility of Forward Osmosis for Desalination and Water Reclamation: Application Examples at the Pilot and Full Scales
- Q&A
Beatriz Corzo, Acciona Agua

17:55 New Developments in Desalination Through Electro-Separation Technologies
- Q&A
Jaime Sanchez, GE Power

18:20 Panel discussion with Audience Participation:
- Extended Q&A
- Discussion of Topics to be Selected by Audience
Through Real-Time Voting System
Moderator: Domingo Zarzo
Final Questionnaire Through Real-Time Voting System

Workshop 6: Microalgae-Based Wastewater Treatment Facilities: Progress, Experiences and Perspectives for the next Years

Organiser: Zouhayr Arbib, FCC Aqualia, S.A.

Objective: Share the knowledge about full-scale facilities based on microalgae growth for wastewater treatment combined with bioenergy production.
Chair: John Benemann

15:00 Welcome Remarks and Workshop Chartering
- Introductions and agenda review
- Defining expectations from participants
Zouhayr Arbib

15:10 Process fundamentals of algal – bacterial wastewater treatment:
- How to manage interactions between microalgae and bacteria
- Pure species versus polycultures in open systems: can we force the process?
- Productivity of microalgae and bacteria systems: ratio algae/bacteria?
Eugenia J. Olguín

15:30 Approaches to microalgae and bacteria Wastewater Treatment:
- Complete process versus tertiary treatment
- Primary or pretreated wastewater: effect of solid content?
Udi Leshem

15:50 Algae biomass: sludge or added value product?
- How to use the microalgae-bacteria biomass: Anaerobic digestion and/or biofertilisers, other biofuels conversion processes.
- Added value products in WWTP?
Jose Antonio Perales

16:10 Harvesting in a sustainable way?
- 1 or 2 steps
- Robustness
- Low energy requirement
Robert Reinhardt

16:40 Coffee Break

17:00 Design and process control of large scale microalgae and bacteria wastewater treatment
Chair: Jose Antonio Perales
- How to construct low cost high rate algal ponds? earthworks, liners, what limits to scale?
- CO₂ or not to CO₂?
El Hamouri Bouchaib

17:20 Large scale WWTP based in microalgae and bacteria process
- New Zealand multi-hectare demonstrations
- All-gas project: From wastewater to bioenergy
- Four Decades of Raceway Ponds in California.
John Benemann

17:40 Economics and Environmental sustainability:
- Economics: CAPEX and OPEX
- Environment: Energy reduction impact in WWTP
Enrique Lara

18:00 Panel Discussion with Audience Participation:
Knowledge gaps and remaining challenges for accelerating adoption of wastewater treatment in high rate algal ponds
All, Chair: Frank Rogalla
Tuesday, 14 June 2016

08:00
Registration opens

09:00
Opening Address
Mark van Loosdrecht, Programme Committee Chairman of LET2016
Helmut Kroiss, President of the International Water Association
Mamen Sánchez Díaz, Mayoress Jerez de la Frontera

09:30
Challenges and opportunities for innovation in water management and infrastructure in Andalucia
Belén Gualda González
Secretary General of Environment and Climate Change, Regional Government of Andalucía, Environmental and Land Planning Office

Belén Gualda was nominated Secretary General of the Environment and Climate Change in July 2015. She was born in Granada in 1974; she is a Civil Engineer (Ingeniero de Caminos). Since April 2011 she has been General Director of Infrastructure and Operation of the Water Board, after occupying the Directorate General of Infrastructure and Exploitation of the extinct Andalusian Water Agency (2011). The new secretary general has extensive experience in the Regional Government, where she has been Director of the Division of Environmental Infrastructure and Water Management of Egmasa (Environmental Management Company, SA), between November 2009 and January 2011, and General Director of Transport of the Ministry of Public Works (2008-2009).

10:15
Water Innovation Actions in the context of the Circular Economy
Carmen Mena Abela
European Commission Executive Agency for SMEs

Carmen Mena Abela is the Head of the “H2020 Eco-Innovation” sector in the European Commission Executive Agency for SMEs (EASME) since 2014, responsible for the implementation of the Systemic Eco-Innovation and Circular Economy Calls under the European Research and Innovation Program, H2020. She has worked for sixteen years in European Research; in the fields of transport, tourism, and electronic infrastructures, under the Information, Science & Technology programs and in the fields of science & society and environment under the Capacities program. Before joining the European Commission in 1998, she worked in IT for five years for Cray Systems UK, in the customs & taxation field. She is a Computer Scientist and has a Master of Science in Analysis, Design and Management of Information Systems by the London School of Economics and Political Science.

11:00 – 11:30
Morning break

11:30
When dancing with sharks ... impacts of innovation implies intimacy with your investors
Piers Clark
Isle Utilities, UK

Piers is Isle Utilities’ Chairman. Isle Utilities is a technical, specialist water consultancy with offices in the UK, Netherlands, the USA, Australia, Singapore and Abu Dhabi. Piers was previously the Managing Director for the private equity fund Global Water Development Partners (GWDP), a Blackstone portfolio company. From 2010-14 he was the Commercial Director at Thames Water, the largest of the UK water companies (serving 15 million people). Piers was responsible for all of Thames Water’s non-regulated business activities. Piers also served as Interim Asset Management Director for Thames Water. Prior to joining Thames Water, Piers was Managing Director of Mouchel’s Regulated Industries leading a team of 3,000 staff providing engineering consultancy and operational maintenance services in the water, energy, environment and rail sectors. He is a Board director for the IFC-backed Haiti-based water kiosk business Dlo Haiti, and is an Advisor to the Canadian water private equity fund XPF. He has a PhD in Civil Engineering.

12:15
The Membrane-aerated Biofilm Reactor (MABR): Full-scale Applications
Eoin Casey
University College Dublin, Ireland

Eoin Casey is currently Associate Professor in the School of Chemical and Bioprocess Engineering, University College Dublin (UCD), Ireland. He is also co-founder of OxyMem Ltd, a UCD spin-out company. His research is focussed on both biofilms and on membrane filtration. This research underpins an applied programme aimed at developing new and improved processes for water and wastewater treatment. One of his achievements was the development of the reaction engineering framework and scale-up strategy for the membrane-aerated biofilm reactor (MABR), a wastewater treatment technology that uses 75% less energy than existing aerobic biological treatment technology. Significant awards include a European Research Council starting grant (2011), Fellowship of the IChemE (2014), overall Winner (Excellence in IP) at the Intellectual Property awards (2014).
13:00

**Combatting Antibiotic Resistance in the Water Sector**

Amy Pruden
Virginia Tech, USA

Amy Pruden is a Professor of Civil & Environmental Engineering at Virginia Tech in Blacksburg, VA, USA. Her primary expertise is on tracking pathogens and antibiotic resistance genes through environmental systems and developing engineering control strategies for protecting public health. Her broad research mission is to advance the sustainability and health of our water systems through fundamental understanding of microbial ecology. Dr. Pruden received the Presidential Early Career Award in Science and Engineering in 2007 and the Paul L. Busch Award in 2014. Her 2014 article “Balancing Water Sustainability and Public Health Goals in the Face of Growing Concerns about Antibiotic Resistance,” was recognised as the Editor’s Choice Best Feature Article in *Environmental Science and Technology*. Dr. Pruden’s research has been funded by the National Science Foundation, Water Research Foundation, Water Environment Research Foundation, Department of Energy, the U.S. Environmental Protection Agency, and the Alfred P. Sloan Foundation.

13:45 – 14:45

**Lunch**

14:45

**Discovery of the “Comammox” Bacteria and other Nitrifiers for Wastewater Treatment**

Per Halkjær Nielsen,
Aalborg University, Denmark

Per Halkjær Nielsen is full professor at the Department of Chemistry and Bioscience at Aalborg University, Denmark, where he is heading the multidisciplinary Center for Microbial Communities. His research group has been active in environmental biotechnology for over 25 years, focusing on microbial ecology of biological wastewater treatment, bioenergy production, bioremediation, biofilms, infection of implants and development of systems microbiology approaches based on new sequencing technologies. He chaired the IWA Specialist Group “Microbial Ecology and Water Engineering” for 8 years (2005-2013) and is Chair of the IWA BioCluster. He is a fellow of the Danish Academy of Technical Sciences (ATV) and the International Water Association (IWA) and has received several prestigious awards. He has published more than 230 peer-reviewed publications. His main research interest is microbial ecology in water engineering, particularly related to wastewater treatment where he has developed and applied several novel methods to study uncultured microorganisms, e.g. by use of DNA technologies. He participated recently in the discovery of the novel nitrifying Comammox bacteria published in *Nature*.

15:30

**Innovative Smart Solutions for Sustainable Water Services**

Eva Martínez Díaz
FCC Aqualia, S.A., Spain

Eva Martínez Díaz is responsible for the Smart Services Area of the Innovation and Technology Department at Aqualia, where she coordinates R&D projects and is in charge of strategy and partnerships in Europe within the ICT and smart technologies in the water field. Before joining Aqualia she worked as project Manager at Technologie-Transfer-Zentrum in Germany, developing and managing a number of environmental and water projects and later as Business Unit Manager at a research consultancy in Spain, leading and conducting strategy development with public and private entities in the field of water management, environment, ICT and sustainability. She graduated from the Polytechnic University of Valencia (Spain) where she studied Agriculture Engineering, and holds a BSc (Hons) in Environment Sciences at Coventry University (UK) and MSc in Integrated Environmental Management at Nottingham Trent University (UK).

16:15 – 16:45

**Afternoon break**

16:45

**Industrial Innovation Forum**

Co-chairs: Stuart Moss, Isle Utilities; Avelino Brito, AENOR
The New Pulsion MBR. Christoph Thiemig (Koch)
The innovative SolidStream hydrolysis. Paul Nielsen (Cambi)
Shepherd – floc monitoring and management for activated sludge. Annie Brooking (Bactest)
Pyrolysis for phosphorus recovery. Kevin Friedrich (Pyreg)
WASSTRIIP to turbo-charge nutrient removal and recovery. Philip Abray (Ostara)
SeMPAC: a compact technology for micropollutants removal. Nicolas de Arespacochaga (SUEZ)
Audience vote for the most innovative proposal

18:15 – 19:30

**Poster Exhibition and Cocktail**
### Wednesday, 15 June 2016

**Technical Sessions – Venue:** Hotel EXE Guadalete Avda. Duque de Abrantes, 84. Jerez de la Frontera

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<th>Room 1</th>
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<tbody>
<tr>
<td><strong>SESSION 1: SUSTAINABLE DESALINATION</strong>&lt;br&gt;Co-Chairs: Maria Kennedy, Amy Childress</td>
<td><strong>SESSION 2: CIRCULAR ECONOMY – RECOVERY OF WATER, ENERGY AND NUTRIENTS</strong>&lt;br&gt;Co-Chairs: Aurora Seco, Bruce Rittmann</td>
</tr>
<tr>
<td><strong>09:30</strong>&lt;br&gt;Keynote (1): Ceramic Membrane Filtration for Pre-treatment of Desalination&lt;br&gt;Jonathan Clement, PWN Technologies (Netherlands)</td>
<td><strong>Keynote (1): Exopolysaccharide Biorefining from Used Water: An Enterprise in the Microbiome of Granular Sludge&lt;br&gt;David Weissbrodt &amp; Lorena Guimarães, Delft University of Technology (Netherlands)</strong></td>
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<td><strong>10:00</strong>&lt;br&gt;Improving RO Sustainability by Choosing the Right Target and the Right Process for the Pre-treatment / France&lt;br&gt;Jeong Sanghyun, IFTS (France)</td>
<td><strong>Implementation of a P-Recovery System in Calahorra Wastewater Treatment Plant&lt;br&gt;Alberto Bouzas, Universitat de València (Spain)</strong></td>
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<tr>
<td><strong>10:15</strong>&lt;br&gt;Advanced Technologies for Sustainable Seawater Desalination&lt;br&gt;Amy Childress, University of Southern California (USA)</td>
<td><strong>Application of Magnetic Microsorbents for Separation, Concentration and Recovery of Phosphate from Wastewater Streams&lt;br&gt;Asya Drenkova-Tuhtan, University of Stuttgart (Germany)</strong></td>
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<tr>
<td><strong>10:30</strong>&lt;br&gt;Discussion</td>
<td><strong>Discussion</strong></td>
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<tr>
<td><strong>11:00 – 11:30</strong>&lt;br&gt;Morning break / Poster exhibition</td>
<td><strong>11:00</strong>&lt;br&gt;Keynote (2): Innovative Pre-treatment Technologies for Sustainable Operation of Sea Water Reverse Osmosis Systems During Algal Blooms&lt;br&gt;Maria Kennedy, UNESCO-IHE (Netherlands)</td>
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<td><strong>12:00</strong>&lt;br&gt;Life Cycle Assessment of Capacitive Deionisation Technology for Brackish Water/ China&lt;br&gt;Ting Hua Yu, National Taiwan University (Chinese Taiwan)</td>
<td><strong>Prioritisation of Anaerobic Membrane Bioreactor (ANMBR) Research &amp; Development through Quantitative Sustainable Design&lt;br&gt;Brian Shoener, University of Illinois (USA)</strong></td>
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<td><strong>12:15</strong>&lt;br&gt;Six Years of Operation of the Largest EDR Plant in the World, to Improve Drinking Water Quality in the Area of Barcelona/ Spain&lt;br&gt;Fernando Valero-Cervera, ATLL Concessionària Generalitat de Catalunya S. A. (Spain)</td>
<td><strong>Poster Pitch</strong>&lt;br&gt;• Nutrient Recovery From Biogas Digestate By Optimised Membrane Treatment – Screening And Process Development. Tobias Gienau, Osnabrück University of Applied Sciences (Germany)&lt;br&gt;• Effect Of Hydrodynamic Stress In An EGSB Reactor For Biohydrogen Production Using Granular Methanogenic Sludge, Germán Buitrón, Universidad Nacional Autónoma de México (Mexico)&lt;br&gt;• AnMBR, From Concept To Full-scale And Future Outlook. Reuben Bouman, Biothane Systems International (Netherlands)**</td>
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<td><strong>12:30</strong>&lt;br&gt;Discussion</td>
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<td><strong>13:00</strong>&lt;br&gt;Poster Pitch&lt;br&gt;• Environmentally Friendly Antiscalant For Wastewater Reclamation Using Reverse Osmosis Membrane Systems. Nuria Adroer, ADIOQUIMICA S.A. (Spain)&lt;br&gt;• High-Performance And Energy-Efficient Seawater Ultrafiltration Pretreatment: HIPLUS Technology. Marina Amaldos, Acciona Agua SAU (Spain)&lt;br&gt;• Biofouling Control By d-Tyrosine Incorporated Zeolite Nanocomposite Membrane. Qilin Li, Rice University (United States)**</td>
<td><strong>Poster Pitch</strong>&lt;br&gt;• Six Years of Operation of the Largest EDR Plant in the World, to Improve Drinking Water Quality in the Area of Barcelona/Spain. Fernando Valero-Cervera, ATLL Concessionària Generalitat de Catalunya S.A. (Spain)**</td>
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<td><strong>13:15 – 14:15</strong>&lt;br&gt;Lunch</td>
<td><strong>SESSION 3: CONTAMINANTS OF EMERGING CONCERN: ANTIBIOTIC RESISTANCE, MICROBIOLOGICAL HAZARDS, NANO-POLLUTANTS</strong>&lt;br&gt;Co-Chairs: Javier Marugan, Amy Pruden</td>
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<td><strong>SESSION 4: ENERGY EFFICIENT WATER AND WASTEWATER MANAGEMENT</strong>&lt;br&gt;Co-Chairs: Anuska Mosquera, Mark van Loosdrecht</td>
<td><strong>Keynote (1): Developing in Water Analysis for Emerging Environmental Contaminants&lt;br&gt;Ana Agüera, Universidad de Almería (Spain)</strong></td>
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<td><strong>14:15</strong>&lt;br&gt;Keynote (1): Developments in Water Analysis for Emerging Environmental Contaminants&lt;br&gt;Ana Agüera, Universidad de Almería (Spain)</td>
<td><strong>Keynote (1): Striving for Eco-efficiency in Wastewater Management: Are Anaerobic Membrane Bioreactors the Right Path Forward?&lt;br&gt;Adam Smith, University of Southern California (USA)</strong></td>
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<td>New Decentralised Approach to Hospital Wastewater Treatment</td>
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<td>Advanced Reduction Processes for Trace Organic Contaminant Removal in Drinking Water Treatment</td>
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<td>Afternoon break / Poster exhibition</td>
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<td>16:15</td>
<td>Keynote (2): Can Advanced Oxidation Processes be an Effective Urban Wastewater Disinfection Process for Controlling Antibiotic Resistance Spread into the Environment?</td>
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<td>Keynote (2): Electrical Load Shifting: Opportunities and Constraints in the Field of Municipal Wastewater Treatment</td>
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<td>Elimination of Organic Micro-pollutants from Secondary Wastewater Effluent Using Granular Activated Carbon (GAC Filters)</td>
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<td>Energy-positive Wastewater Treatment Based on Anaerobic MBBR, Partial Nitrification/Anammmox and Microalgae</td>
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<td>17:00</td>
<td>Leading Edge Research of Direct Potable Water Reuse in the United States</td>
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<td>Enhancing Energy Efficiency of Membrane Aerated Biofilm Reactors (MABRs) by Managing of Gas Back-Diffusion</td>
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<td>Poster Pitch</td>
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<td>• Occurrence Of Pharmaceuticals And UV Filters In Swimming Pools And Spas And Their Correlation To Pool Water Treatment. Maria Kennedy, UNESCO-IHE - Institute for Water Education (Netherlands)</td>
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<td>• Pesticides Removal By Advanced Oxidation Technologies In The Water Reclamation Process. Natividad Miguel, University of Zaragoza (Spain)</td>
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<td>• Mechanisms Involved In The Removal Of Micropollutants By Biological Processes: Aerobic MBR And Anaerobic System-UASB. María de los Ángeles Bernal Romero del Hombre Bueno, University of Alicante (Spain)</td>
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<td>Poster Pitch</td>
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<td>• Reciprocating Anaerobic Membrane Bioreactor As An Energy Efficient Pre-treatment For Mainstream Anammmox. Jurg Keller, The University of Queensland (Australia)</td>
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<td>• Leachate Treatment Using Aerobic Granular Sludge. Qiuyan Yuan, Univerisity of Manitoba (Canada)</td>
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<td>• How To Save Energy In A WWTP And Enhance Nutrient Removal Through On-line Aeration Control, The Case Of OptimEDAR. Montserrat Batlle, TEQMA (Spain)</td>
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<td>18:00</td>
<td>End of sessions</td>
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<tr>
<td>19:30</td>
<td>Social programme: Horse performance (Real Escuela Andaluza del Arte Ecuestre) + Tapas tour (Historic Centre). (Please check the map on page 3)</td>
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### Technical Sessions – Venue: Hotel EXE Guadalete, Avda. Duque de Abrantes, 84, Jerez de la Frontera

**Thursday, 16 June 2016**

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<td><strong>SESSION 5: ADVANCED MATERIALS – NANOTECHNOLOGY AND NEW MEMBRANES</strong>&lt;br&gt;Co-Chairs: Qilin Li, Jun Ma</td>
<td><strong>SESSION 6: SOLAR AND ALGAL BASED WATER TECHNOLOGIES</strong>&lt;br&gt;Co-Chairs: Jose Antonio Perales, Pilar Fernandez</td>
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<td><strong>09:30</strong>&lt;br&gt;Keynote (1): Novel Nano-filtration Membrane Active Layers with Dendritic and Macromolecular Building Blocks&lt;br&gt;Benito Marinas, University of Illinois at Urbana-Champaign (USA)</td>
<td><strong>09:30</strong>&lt;br&gt;Keynote (1): Novel Photocatalytic Materials for Solar Water Treatment&lt;br&gt;John Anthony Byrne, Ulster University (UK)</td>
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<td><strong>10:00</strong>&lt;br&gt;Novel Membrane And Membrane Combination Process In Drinking Water Treatment&lt;br&gt;Panpan Wang, Harbin Institute of Technology (China)</td>
<td><strong>10:00</strong>&lt;br&gt;Modelling Shortcut Nitrogen Removal from Wastewater Using an Algal-bacterial Consortium&lt;br&gt;Angelica Rada-Ariza, UNESCO-IHE (Netherlands)</td>
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<td><strong>10:15</strong>&lt;br&gt;Nanotechnology-Enabled Water Treatment (NEWT): A Vision to Enable Decentralised Water Treatment and Reuse&lt;br&gt;Pedro Alvarez, Rice University (USA)</td>
<td><strong>10:15</strong>&lt;br&gt;Performance of a Pilot-scale Membrane-coupled High-rate Algal Pond (MHRAP) for Urban Wastewater Treatment&lt;br&gt;Ángel Robles, Universitat Politècnica de València (Spain)</td>
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<td><strong>10:30</strong>&lt;br&gt;Discussion</td>
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<td><strong>11:30</strong>&lt;br&gt;Keynote (2): Using aquaporin proteins for low-pressure desalination in biomimetic membranes&lt;br&gt;Yen Wah Tong, National University of Singapore (Singapore)</td>
<td><strong>11:30</strong>&lt;br&gt;Keynote (2): On the Contribution of Microalgae to Wastewater Treatment Processes&lt;br&gt;Gabriel Acién, University of Almeria (Spain)</td>
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<td><strong>12:00</strong>&lt;br&gt;Development and Application of an Enzymatic Reactor with Magnetic Nanoparticles for the Removal of Emerging Pollutants&lt;br&gt;M.Teresa Moreira, University of Santiago de Compostela (Spain)</td>
<td><strong>12:00</strong>&lt;br&gt;Solar Water Disinfection (SODIS): Is Its Greatest Advantage Its Biggest Obstacle to Use?&lt;br&gt;Kevin McGuigan, Royal College of Surgeons in Ireland (Ireland)</td>
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<td><strong>12:15</strong>&lt;br&gt;Enhancing Capacitive Deionisation Technology as an Effective Method for Water Treatment&lt;br&gt;Derya Dursun, Middle East Technical University (Turkey)</td>
<td><strong>12:15</strong>&lt;br&gt;Photocatalytic Degradation of Lindane with a Nano-TiO$^2$ Suspension&lt;br&gt;Silvia Escuadra, Zaragoza University (Spain)</td>
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<td><strong>12:30</strong>&lt;br&gt;Discussion</td>
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<td><strong>13:00</strong>&lt;br&gt;Poster Pitch&lt;br&gt; • Nanotest For Fungal Infections, A Self-Diagnostic And Hygiene Control Tool For Public Places. Tobi Sojinrin, Dublin Institute of Technology (Ireland)&lt;br&gt; • Novel Thin-film Nanofiber Composite (TNC) Membrane For Osmotic Energy Harvesting. Moon Son, Gwangju Institute of Science and Technology (GIST) (Republic of Korea)&lt;br&gt; • Comparison Of Fouling Resilience Of Two Ceramic Nanofiltration Membranes Of TiO2 With Enlarged Surface. Mihaela-Elena Dascalu, Vasile Alecsandri, University of Bacau (Romania)</td>
<td><strong>13:00</strong>&lt;br&gt;Poster Pitch&lt;br&gt; • Influence Of pH On The Solar Disinfection Of Simulated MWTP Effluent. Evaluation Against Cryptosporidium. Hipólito Gómez-Couso University of Santiago de Compostela (Spain)&lt;br&gt; • Selective Pressures Drive Algal Community Function, Nutrient Recovery, And Feedstock Production In Wastewater Treatment. Ian Bradley, University of Illinois at Urbana-Champaign (USA)&lt;br&gt; • Optimal Algal Cultivation For Used Water Resource Recovery. Dorottya Wagner, Technical University of Denmark (Denmark)</td>
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<td><strong>13:15 – 14:15</strong>&lt;br&gt;Lunch</td>
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<td><strong>14:15</strong>&lt;br&gt;Keynote (1): Smart Water Utilities: Complexity Made Simple&lt;br&gt;Pernille Ingildsen, Kalundborg Utility (Denmark)</td>
<td><strong>14:15</strong>&lt;br&gt;Keynote (1): Integration of Advances in Material Science with Microbial Electrolysis Cells for Resource Recovery from Domestic Wastewater&lt;br&gt;Pascal Saikaly, King Abdullah University of Science and Technology (Saudi Arabia)</td>
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<td><strong>14:45</strong>&lt;br&gt;Management of Water Supply Services Through Integral Operation Based on Advance Smart Metering Schemes&lt;br&gt;Joan Carles Guardiola, Aguas de Valencia S.A. (Spain)</td>
<td><strong>14:45</strong>&lt;br&gt;Hydrogen Peroxide Production at High Concentration in Continuous-flow Cathode Microbial Electrochemical Cells&lt;br&gt;Michelle Young, Arizona State University (USA)</td>
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<td>15:00</td>
<td>Online Methodology for Determining THM Formation Potential and Predicted Network TTHM Levels Aids Operations</td>
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<td>16:15</td>
<td>Keynote (2): METs Meet Water at Full Scale: From Nano to Kilo</td>
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<td>16:45</td>
<td>Online Orthophosphate Measurement in Full-scale WWTPs Using a Novel Potentiometric Sensor</td>
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<td>NONIT: Scaling-up BES for Treating Nitrate-polluted Ground Water</td>
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<td>Integrated Wastewater System Modelling: A New Approach for the Development of Long Term Integrated Plans for Wet Weather</td>
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<td>Electrochemistry and Bioelectrochemistry for Removal of Sulphur Species from Water</td>
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<td>End of technical programme</td>
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<td>18:15</td>
<td>Closing session</td>
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<td>End of Conference</td>
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<td>19:30</td>
<td>Gala Dinner (Gonzalez Byass Winery). (Please check the map on page 3)</td>
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The project BioSolWaRe-LIFE13 ENV/FR/000711 is a Demonstration wastewater treatment system dedicated to wastewater reuse and recycling, funded through the Programme LIFE+ Environment Policy & Governance.

Please read: www.let2016.org

La Ranilla wastewater treatment plant began operating in 2008. It treats urban wastewater of an equivalent population of 550,000 i.e. The average design flow is 90,000 m$^3$/day, and treated water is discharged into the Ranilla stream, within the Guadalquivir area. The WWTP includes a preliminary treatment, followed by a primary settling process, an activated sludge biological treatment, and a tertiary process to polish the outlet water. All the processes in the facility are covered to avoid bad odors. It also has a chemical system to remove the odorous compounds.

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One of the challenges in the water sector is to avoid the production of residuals at the different stages in the water cycle, or at least to take maximum advantage of them. Our aim is to achieve the highest possible degree of sustainability and efficiency. On the contrary, with current technology, such as the activated sludge process that is already 100 years old, wastewater treatment involves high energy needs and sludge production.

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The combination of PYREG® technology with ELIQUO®’s proprietary low temperature sludge drying system EloDry® provides an energy-efficient cost-effective decentral thermal disposal route for biosolids that at the same time recovers a valuable phosphorus product.

FLAGSHIP PROJECT: WWTP Linz-Unkel

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Bruce Rittmann, Arizona University (United States)
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Keith Robertson, IWA (Netherlands)
Paloma Velasco, CDTI (Spain)

CONFERENCE VENUE

The 13th Leading Edge Conference on Water and Wastewater Technologies will be hosted at:

Hotel exe Guadalete
Avda. Duque de Abrantes 84, 11407 Jerez de la Frontera, Cadiz, Spain

Hotel SHERRY PARK.
Avda. Alcalde Álvaro Domecq 11. Jerez de la Frontera (Workshops)

ENQUIRIES

Conference Programme Secretariat
Please contact: let2016@iwahq.org

Registration Secretariat
Please contact: agency@eventur-spain.com
ORGANISERS

The International Water Association (IWA) is a global network of water professionals, spanning the continuum between research and practice and covering all facets of the water cycle. Through IWA, members collaborate to promote the development and implementation of innovative and effective approaches to water management.

The strength of IWA lies in the professional and geographic diversity of its membership – a global mosaic of member communities, including academic researchers and research centers, utilities, consultants, regulators, industrial water users and water equipment manufacturers. IWA members from each of these communities represent the leading edge in their fields of expertise; together they are building new frontiers in the research and implementation of water and wastewater treatment technologies, with the framework of the total water cycle.

AEAS (Spanish Association of Water Supply and Sanitation) is the leading professional association of water operators and enterprises responsible for the operation, maintenance, exploitation and management of urban water.

AEAS associates are water management entities, regional associations, research institutions, manufacturers, associations spanning all sectors of the water industry and individual professionals or academic members, that provide water supply, management and reuse services in public, private and mixed models, encompassing more than three quarters of the Spanish population.

AEAS members are experts in multiple disciplines, from the most technical (such as equipment and process control, leakage detection and prevention or remote control of complex systems), to educational dissemination, promotion towards a more “rational use of water”, customer management optimisation and smart water solutions.

AEAS is the leading agent for cooperation, transference and dissemination of practical knowledge and experience, know-how and information of the water sector in Spain. The biennial survey on supply and sanitation services is a valuable benchmarking tool at sector and country level. The technical meetings are the best possible forum for knowledge and information exchange.

AEAS has established Technical Commissions and Working Groups that provide support, develop studies, reports and proposals on the different areas of urban water cycle: abstraction and water treatment engineering; quality and water treatment; distribution networks; urban drainage and sewerage; waste water treatment; management and commercial relations; economics and statistics; RDI; CSR.

AEAS works in close cooperation with EurEau and other international associations such as IWA, OECD and Latin-American associations.

FCC Aqualia, S.A. is the water management company of FCC, one of the largest European services groups. Aqualia is the third largest private water company in Europe and sixth in the world, according to the latest ranking by the specialist publication Global Water Intelligence, and serves 23.5 million users.

It currently provides service to 1,100 towns in 22 countries: Spain, Italy, Portugal, the Czech Republic, Poland, Romania, Montenegro, Bosnia, Mexico, Peru, Chile, Uruguay, Algeria, Egypt, the United Arab Emirates, Saudi Arabia, China, South Africa, Tunisia, Qatar, Serbia and Kosovo.

Aqualia responds to the needs of all parties, private and public, at all stages of the water cycle, providing water for human, industrial, and agricultural uses. Its main activity is the management of municipal water services.

In a short space of time Aqualia has positioned itself as a leader in the sector, a cohesive, specialist operator at the forefront of the sector thanks to a highly-specialised and committed team that is constantly seeking new ways to improve efficiency in production processes and optimise resources. This modus operandi, which has enabled Aqualia to consolidate itself as leader in the domestic market, is also apparent in export markets, with a strategy formulated to consolidate ambitious but prudent growth overseas.

The Group of Environmental Engineering and Bioprocesses of the University of Santiago de Compostela started its activity in 1986 and nowadays it comprises 9 professors and associated professors, 8 post-doctoral researchers, 5 technical staff, more than 30 PhD students and 5-10 students from foreign universities. Its Mission is to generate scientific and technological knowledge useful for a sustainable development of society and to train entrepreneurial researchers, promoting synergies in a human and stimulating environment.

The group focuses its activity mainly on four research lines: 1- Novel wastewater treatment technologies. 2- Environmental Management. 3 -Treatment of gases in diffuse emissions by biofiltration. 4 – Biorefinery.

In the last 8 years it has participated in 12 European projects and international networks, 42 Spanish projects and celebrated 52 research contracts with companies. The scientific production included 32 PhD Theses, more than 450 papers in international journals and 10 Patents (4 European or international) 4 of them being licensed to companies. The Group coordinates 3 research networks dealing with wastewater treatment at European (Cost Action Water_2020), Spanish level (RedNovedar) and Galician (REGATA).

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The simplified design of the PULSION MBR uses 40% less aeration energy to pulse a large bubble through a chambered fiber bundle creating a piston-like pumping action that is more efficient and requires a smaller system footprint than previous models.

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The 14th IWA Leading Edge Conference on Water and Wastewater Technologies is designed to accelerate the development of new water ideas, supporting the transition of technology from research to practice. The 14th edition of the IWA LET will pick up from where the previous editions of the conference left off, ensuring a continuity in the pursuit for innovation through dialogue, while responding to new challenges and trends, promoting and disseminating sustainable water solutions. For those who are looking to introduce new ideas and concepts, and those looking for them, this is the one conference of the year that should not be missed.

For more information please contact let2017@iwahq.org