Conference Information 会议信息

# The 18th IWA Conference on Sustainable Sludge Management

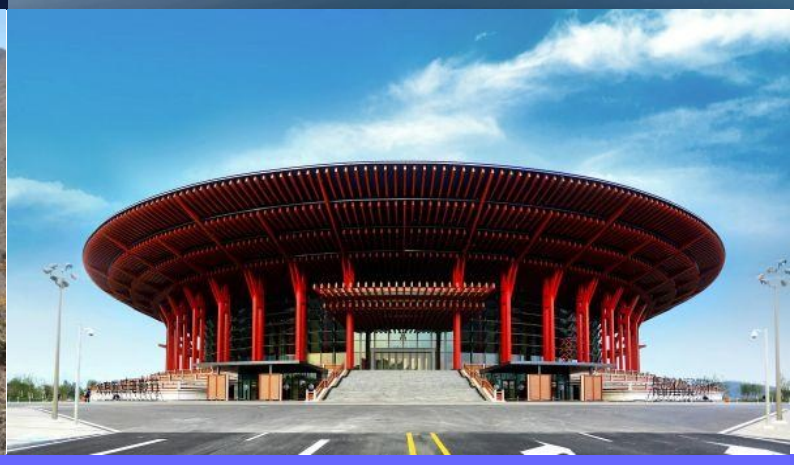
## 国际水协第18届可持续污泥技术与管理会议

## 中国环境科学学会固废分会 2024 年年会

## 第 1 届中国污泥 100 人高层技术与管理论坛

**Beijing, China — 18-20, May 2024**



# CONFERENCE GUIDE

**Co-organizers:**

# Registration

## Conference Onsite Registration

| 2024-05-17（Friday） | | |
|---|---|---|
| Conference Onsite Registration | 8:00-12:00 | Beijing China-Germany International Conference Convention & Exhibition Center (北京中德国际会议会展中心) |
| Buffet Lunch | 12:00-13:00 | Dinner Hall in Beijing China-Germany International Conference Convention & Exhibition Center |
| Conference Onsite Registration | 13:00-22:00 | Beijing China-Germany International Conference Convention & Exhibition Center (北京中德国际会议会展中心) |
| Buffet Lunch | 18:30-20:00 | Dinner Hall in Beijing China-Germany International Conference Convention & Exhibition Center |

| 2024-05-18（Saturday） | | |
|---|---|---|
| Conference Onsite Registration | 8:00-12:00 | Beijing China-Germany International Conference Convention & Exhibition Center (北京中德国际会议会展中心) |
| Buffet Lunch | 12:00-13:00 | Dinner Hall in Beijing China-Germany International Conference Convention & Exhibition Center |
| Conference Onsite Registration | 13:00-22:00 | Beijing China-Germany International Conference Convention & Exhibition Center (北京中德国际会议会展中心) |
| Buffet Lunch | 18:30-20:00 | Dinner Hall in Beijing China-Germany International Conference Convention & Exhibition Center |

# Conference Programme

**Opening Ceremony & Keynote Speech**

| 2024-05-18 | | |
|---|---|---|
| 9:00-10:00<br>Opening Ceremony | | **Opening Speech Delivered by Leaders of Conference Organizers**<br>会议组织单位负责人致开幕辞<br>**Opening Remark Delivered by Representative of International Water Association（IWA）**<br>国际水协（IWA）相关代表致开幕辞<br>**Award of the 2024 P. Aarne Vesilind Specialist Medal for Residuals Research**<br>国际水协（IWA）污泥技术与管理成就奖颁奖 |
| 10:00-12:00<br>Keynote Speech | 10:00-10:30 | **Sludge Management Challenges - Current Status and Future Trends in the U.S. and Beyond**<br>污泥管理挑战——美国及其他地区的当前状态和未来趋势<br>**Kwok-Wai Richard Tsang (CDM Smith, United States )** |
| | 10:30-11:00 | **Application and Effect of Advanced Anaerobic Digestion Technology in Beijing Drainage Group Co., Ltd.**<br>北排集团污泥高级厌氧消化技术应用实践与成效<br>**Lei Shi（Beijing Drainage Group Co., Ltd., China）** |
| | 11:00-11:30 | **The Development and Future Trend of Sludge Management in Japan**<br>日本污泥管理的发展和未来趋势<br>**Masaki Takaoka (Kyoto University, Japan)** |
| | 11:30-12:00 | **Green Low-carbon Sustainable Technology for Sludge Resources Recovery and Utilization**<br>污泥绿色低碳可持续资源化利用技术发展趋势<br>**Guoren Xu（University of Chinese Academy of Sciences, China）** |
| Buffet Lunch 12:00-13:30 | | |

# Conference Programme

**Opening Ceremony & Keynote Speech**

| 2024-05-18 | | |
|---|---|---|
| 13:30-17:30 | 13:30-14:00 | **Sludge/Biosolids Management: A New Global Vision and the Regulatory Evolution in Europe**<br>污泥/生物固体管理：全球新视野和欧洲的监管演变<br>**Ludovico Spinosa**<br>**(ISO/CEN Expert Member, UNI/GL5 Coordinator, Env. Cons. at ETS s.r.l., Bari, Italy)** |
| | 14:00-14:30 | **The Changing Landscape of Biosolids Management Around the World – What Does the Future Hold?**<br>全球生物固体管理格局的变化——未来发展趋势？<br>**Banu Örmeci（Carleton University, Canada）** |
| Keynote | 14:30-15:00 | **Evolutional Approaches to Handling Sludge from Wastewater Treatment**<br>污水污泥处理方式的演变<br>**Xiaodi Hao (Beijing University of Civil Engineering and Architecture, China)** |
| Speech | 15:00-15:30 | **Technical Advances and Case Studies on Sludge Composting in China**<br>中国污泥好氧发酵与土地利用技术研究进展<br>**Ji Li (China agricultural university, China)** |
| | 15:30-16:00 | **Sludge Management in Europe and China, Current Practice, Challenge and Outlook**<br>欧洲和中国的污泥管理：现实，挑战和展望<br>**Ping Shi (Suez Environmental Technology, Beijing China)** |
| | 16:00-16:30 | **Veolia's New "Green Up" Program ＆ Tomorrow's Municipal Sludge Solutions**<br>威立雅新战略计划“GreenUp”，为市政污泥处理创造明天的解决方案<br>**Xiaohua Chen (Veolia Water Technologies (Beijing) Co., Ltd, China)** |
| | 16:30-17:00 | **Recent Developments and Future Trends of Sludge Management in Europe and Turkey**<br>欧洲和土耳其污泥管理的最新发展和未来趋势<br>**F. Dilek Sanin (Middle East Technical University, Turkey)** |
| | 17:00-17:30 | **Resource Recovery from Sludge - challenges and the way forward**<br>污泥资源回收——挑战与前进之路<br>**Yan Zhou（Nanyang Technological University, Singapore）** |
| Dinner | 18：00-20:00 | |

# Conference Programme

**ROOM XXXX 2024.05.19**

## The 1st China Top 100 Sludge Forum
## 第1届中国污泥100人高层技术与管理论坛

| | | |
|---|---|---|
| 8:30-10:25<br>Parallel Sessions | 8:30-8:55 | **Environmental Management of Industrial Sludge**<br>工业污泥的环境管理<br>**Qifei Huang（Chinese Research Academy of Environmental Sciences, China）** |
| | 8:55-9:20 | **Policies and Trends for the Safe Handling of Emerging Pollutants of China**<br>新污染物安全处理处置政策与发展方向<br>**Ying Chen (Solid Waste and Chemicals Management Center, Ministry of Ecology and Environment of China，China)** |
| | 9:20-9:45 | **Reflection on Process Selection and Design Difficulties of Sludge and Industrial Waste Co-incineration**<br>污泥与工业废料混合焚烧工艺路线选择和设计难点思考<br>**Minghua Dai (Beijing General Municipal Engineering Design & Research Institute，China)** |
| | 9:45-10:10 | **Life Cycle Assessment (LCA) and Integrated Processes of Sludge Deep Dewatering and Recycling**<br>污泥深度脱水与资源化集成工艺及其全生命周期评估<br>**Dongsheng Wang (Zhejiang University，China)** |
| | 10:10-10:25 | **Discussion**<br>讨论 |
| Coffee Break | 10:25-10:35 | |
| 10:35-12:00<br>Parallel Sessions | 10:35-11:00 | **Treatment and Reuse of Sewage Sludge in China: Status and Prospect**<br>中国污泥处理与资源化：现状与前景<br>**Yuansong Wei**<br>**（Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, China）** |
| | 11:00-11:25 | **Exemplary Industrial Composting System: SACT**<br>示范性工业堆肥系统：SACT<br>**Tao Wang (Machinery Technology Development Co., Ltd., China)** |
| | 11:25-11:50 | **Existing Standard System and Future Direction of Standard Development for Sludge Treatment and Disposal in China**<br>中国污泥处理处置现有标准体系及未来发展方向<br>**Xiuteng Wang (China National Institute of Standardization, China)** |
| | 11:50-12:05 | **Discussion**<br>讨论 |
| Buffet Lunch | 12:05-13:30 | |

# Conference Programme

**ROOM XXXX 2024.05.19**

## The 1st China Top 100 Sludge Forum
第1届中国污泥100人高层技术与管理论坛

| | | |
|---|---|---|
| 14:00-16:05<br>Parallel Sessions | 14:00-14:25 | **The Research and Application of the Conditioning and Dewatering for Sludge from Advanced Anaerobic Digestion in Beijing Drainage Group Co., Ltd.**<br>北排高级厌氧消化污泥调理脱水技术研发与应用效果<br>**Jiawei Wang (Beijing Drainage Group Co., Ltd., China)** |
| | 14:25-14:50 | **Practices of Municipal Sludge Treatment and Disposal in Tianjin**<br>天津市污泥处理与处置实践<br>**Jinhe Li (Tianjin Capital Environmental Protection Group Co., Ltd., China)** |
| | 14:50-15:15 | **Practice of Urban Sludge Treatment and Disposal**<br>城市污泥处理处置的实践<br>**Biqing Li (Guangzhou Sewage Purification Co., Ltd., China)** |
| | 15:15-15:40 | **Challenges and Future Outlook of Land Application of Sewage Sludge in China**<br>中国污泥土地利用的挑战分析和前景展望<br>**Xiang Chen (Yangtze Ecology and Environment Co., Ltd., China)** |
| | 15:40-15:55 | **Discussion**<br>讨论 |
| Coffee Break | 15:55-16:05 | |
| 16:05-18:00<br>Parallel Sessions | 16:05-16:30 | **The Innovative Technology and Route of Resource Recovery and Energy Utilization of Sludge**<br>污泥能源资源化处理处置新路径与新技术<br>**Yunfei Tan（Zhongyuan Environment-Protection Co., Ltd., China）** |
| | 16:30-16:55 | **SUEZ's Global Experience in Sludge Resource Utilization**<br>苏伊士污泥资源化的全球经验<br>**Zhonghong Cheng (Suez Asia)** |
| | 16:55-17:20 | **Innovation and Practice of Sludge Co-incineration in Coal-fired Power Plants**<br>污泥与发电协同处理创新与实践<br>**Xiaojin Wang (China Energy Longyuan Environmental Protection Co., Ltd., China)** |
| | 17:20-17:35 | **Discussion**<br>讨论 |
| Dinner | 18:30-20:00 | |

# Conference Programme

**ROOM XXXX 2024.05.19**

**SESSION 1 Emerging contaminants in sludge – management, treatment, and safe transformation**

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|---|---|---|
| 8:00-10:05<br>Parallel Sessions | 8:00-8:25 | **Pyrolysis of Sewage Sludge in Molten Salt Environment: Effects on Heavy Metals Behavior and Ecological Risk** 熔融盐环境中污水污泥热解:重金属行为及生态风险影响<br>**Zeyu Fan (Changjiang River Scientific Research Institute, China)**<br>Qi Lu[1], Zeyu Fan[*,1], Xian Zhou, Ziling Peng , Zhuo Fan Gao , Shanshan Deng, Xia Chen[*]<br>1. Changjiang River Scientific Research Institute, China |
| | 8:25-8:50 | **Fates and Risk Control of Mercury and Methylmercury in Sludge Biological Treatment**<br>污泥生物处理过程中汞和甲基汞的迁移与风险控制<br>**Jibao Liu (Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, China)**<br>Jibao Liu[1], Zhen Bao[1], Jinyi Wei[1], Yixin Zhang[1], Yuansong Wei[1,*]<br>1. Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, China |
| | 8:50-9:15 | **Fate of Emerging Contaminants in Biosolids on Thermal Pretreatment and Mesophilic Anaerobic Digestion**<br>在热预处理和中温厌氧消化过程中生物固体中新兴污染物的迁移转化<br>**Ashish K Sahu (Cambi Group AS, Norway)**<br>Gowtham Balasundaram[1], Pallavi Gahlot[1], Vinay Kumar Tyagi[2], Absar A Kazmi[1], Harald Kleiven[3], Ashish K Sahu[3]<br>1.Indian Institute of Technology, India 2.National Institute of Hydrology, India 3.Cambi Group AS, Norway |
| | 9:15-9:40 | **Metagenomic Analysis Reveals the Effects of Potassium Ferrate Loaded Steel Slag on Antibiotic Resistance Genes in Digested Sludge and Its Risk Assessment**<br>宏基因组分析揭示铁酸钾负载钢渣对消化污泥中抗生素耐药基因的影响及其风险评估<br>**Qiushuo Zhang (Hebei university, China)**<br>Qiushuo Zhang[1,3], Hongjie Wang [1,2,3], Hang Li [1,3], Yutong Wu [1,3], ZiXue Liu [1,3], Yali Wang [1,2,3,*]<br>1.School of Eco-Environment, Hebei university, China 2.School of life science, Hebei university, China<br>3.Institute of Xiong'an New Area, Hebei university, China |
| | 9:40-9:55 | **Discussion** 讨论 |
| Coffee Break | 9:55-10:05 | |
| 10:05-12:00<br>Parallel Sessions | 10:05-10:30 | **Microplastics in Dewatered Sewage Sludge from Wastewater Treatment Plants in Japan**<br>日本污水处理厂脱水污泥中的微塑料<br>**Sai Liu (Kyoto University, Japan)**<br>Sai Liu[1], Kazuyuki Oshita[1], Masaki Takaoka[1]<br>1. Kyoto University, Japan |
| | 10:30-10:55 | **Microplastics in Anaerobic Digestion of Sludge**<br>厌氧消化污泥中的微塑料<br>**F. Dilek Sanin (Middle East Technical University, Turkey)**<br>İrem Şimşek[1], M. Dilara Hatinoğlu[1], F. Dilek Sanin[1]<br>1 Middle East Technical University, Turkey |
| | 10:55-11:20 | **Antagonistic Impact and Mechanism of Typical Heterogeneous Contaminants Co-occurrence on Anaerobic Sludge Fermentation Process**<br>典型异质性污染物共存对厌氧污泥发酵过程的拮抗影响及机制<br>**Jingyang Luo (Hohai University, China)**<br>Shiyu Fang[1], Wangbei Cao[1], Zhicheng Wei[1], Wen Guo[1], Le Zhang[1], Jingyang Luo [1,*]<br>1. Hohai University, China |
| | 11:20-11:45 | **Solid-Liquid Distribution of Ciprofloxacin during Sludge Dewatering after Fe(II) Activated Peroxymonosulfate Treatment: Focusing on the Role of Dissolved Organic Components**<br>Fe(II)活化过硫酸盐处理污泥脱水过程中环丙沙星的固液分布：关注溶解有机成分的作用<br>**Keke Xiao (Guangdong Technion - Israel Institute of Technology, China)**<br>**Sewage Sludge – the Good, the Bad, and the Ugly. Ten Years of Research on Making Only Good Sewage Sludge**<br>污水污泥的益处、害处和挑战：十年致力于研究污水污泥的益处<br>**Patryk Oleszczuk (Maria Curie-Skłodowska University, Poland)**<br>Monika Raczkiewicz[1], Anna Siatecka[2], Aleksandra Bogusz[3], Magdalena Stefaniuk[4], Patryk Oleszczuk[1,*]<br>1. Maria Curie-Skłodowska University, Poland 2. University of Life Sciences, Poland 3. National Research Institute, Poland<br>4. Maria Curie-Skłodowska University, Poland |
| | 11:45-12:00 | **Discussion** 讨论 |
| Buffet Lunch | 12:00-13:30 | |

# Conference Programme

**ROOM XXXX 2024.05.19**

**SESSION 3 Sludge treatment to enhance recycling and resource recovery in a circular economy（Resource Recovery）**

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|---|---|---|
| 14:00-16:05 | 14:00-14:25 | **Enhanced Phosphorus Recovery from Sewage Sludge through Sequential Acid-Base Extraction and Pyrolysis**<br>顺序酸碱提取与热解协同强化污水污泥磷回收<br>**Teik-Thye Lim (Nanyang Technological University, Singapore)**<br>Satya Brat Tiwari [1,2], Sze Yuet Chin [3], Andrei Veksha [2], Wei Ping Chan [2], Teik-Thye Lim [1,2,*]<br>1. School of Civil and Environmental Engineering, 2. Nanyang Environment and Water Research Institute, 3. Centre of High Field NMR Spectroscopy and Imaging, Nanyang Technological University, Singapore |
| | 14:25-14:50 | **Organic and Inorganic Separation of Sludge and Precise Resource Utilization Technology**<br>污泥中有机无机物分离与精准资源化利用技术<br>**Wang Xueke (Tsinghua University, China)**<br>WANG Xueke [1,2], MU Tong [2],ZHENG Xiaoxuan [2]， ZHANG Chunmiao [2]<br>1.Tsinghua University, China 2.Tianjin Raising Environmental Protection Engineering Co. Ltd., China |
| | 14:50-15:15 | **In-situ Iron Re-utilization for Enhanced Resource Recovery from Iron-rich Sludge**<br>原位铁再利用以增强富铁污泥的资源回收<br>**Ruo-hong Li (Sun Yat-sen University, China)**<br>Lianpeng Sun[1], Ruo-hong Li [1*]<br>1. Sun Yat-sen University, China |
| Parallel Sessions | 15:15-15:40 | **Probiotics for Improving Settleability, Reducing Biosolids Production and Making Class A Residuals**<br>通过益生菌改善沉降性减少生物固体产量并制取A级生物固体<br>**Rob Whiteman (ABS Inc., USA)** |
| | 15:40-15:55 | **Discussion** 讨论 |
| Coffee Break | 15:55-16:05 | |
| 16:05-18:00 | 16:05-16:30 | **The Advantages of Refinery Excess Sludge Carbon as Peracetic Acid Activator: the Role of Functional Groups and Persistent Free Radicals**<br>炼油污泥炭作为过乙酸活化剂的优势:官能团及持久自由基的作用<br>**Cao Yue (China University of Petroleum-Beijing, China)**<br>Cao Yue [1], Li Jinglin, Hu Yuntao, Du Mengqi, Li Zhuoyu*,Wang Qinghong, Chen Chunmao,<br>1. China University of Petroleum-Beijing |
| | 16:30-16:55 | **Taxonomic Characterization of Primary Sludge Bacteria Grown on "Selective" Media for Salmonella Spp.**<br>在沙门氏菌 "选择性 "培养基上培养的初级污泥细菌的分类特征<br>**Adalberto Noyola (Universidad Nacional Autónoma de México, México)**<br>Nathaly M. Alderete-Ludeña [1, 2], Yovany Cuetero-Martínez [1], Aarón-Flores Ramírez [1], Adalberto Noyola [1*]<br>1. Universidad Nacional Autónoma de México, México. 2. Universidad Peruana Cayetano Heredia, Perú |
| Parallel Sessions | 16:55-17:20 | **Aerobic Composting Treatment of Refinery Waste Activated Sludge: Feasibility, Humification, Petroleum Removal Efficiency And Mechanism**<br>炼油废活性污泥的好氧堆肥处理：可行性、腐殖化、石油去除效率和机理<br>**Xinge Fu (China University of Petroleum-Beijing, China)**<br>Xinge Fu [1], Hui Zuo [1], Qinghong Wang [1*], Chunmao Chen [1]<br>1. China University of Petroleum, Beijing, China |
| | 17:20-17:45 | **The Influence of SRT on the Quality and Quantity of VFA Produced from the Fermentation of Wasted Activated Sludge From IFAS-MBR**<br>SRT对IFAS-MBR废活性污泥发酵产生的VFA质量和数量的影响<br>**Giorgio Mannina (Palermo University, Italy)**<br>Giorgio Mannina [1*], Antonio Mineo [1]<br>1. Palermo University, Italy |
| | 17:45-18:10 | **Research Progress in Conversion Mechanism and Resourcing Processes for Aqueous Products from Sludge by Hydrothermal Carbonization**<br>水热碳化法污泥水相产物转化机理及资源化工艺的研究进展<br>**Wei Meng (University of Science and Technology Beijing, China)**<br>Wei Meng [1], Lei Zheng [1], Zifu Li<br>1.University of Science and Technology Beijing, China |
| | 18:10-18:25 | **Discussion** 讨论 |
| Dinner | 18:30-20:00 | |

# Conference Programme

**ROOM XXXX 2024.05.19**

**SESSION 2 Innovative technologies for carbon reduction & sequestration in sludge treatment**

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|---|---|---|
| 8:00-10:05 Parallel Sessions | 8:00-8:25 | **A new strategy for greenhouse gas emission reduction in A/A/O treatment process: The positive role of exogenous N-acyl-homoserine lactones, a quorum-sensing signaling molecules**<br>A/A/O工艺中温室气体减排新策略：外源性N-酰基高丝氨酸内酯的积极作用，一种群体感应信号分子<br>**Wenjiao Sang（Wuhan University of Technology, China）**<br>Wenjiao Sang [1,*], Zhenxue Ge [1], Qian Zhang [1], Fangmao Gan [2], Nianhong Wan[3], Lei Zou[3]<br>1. Wuhan University of Technology, China 2. Yangtze Ecology and Environment Company, China 3. Central & Southern China Municipal Engineering Design & Research Institute Company, Limited, China |
| | 8:25-8:50 | **GHGs Emissions from an Anaerobic Sludge Digestion Wastewater Treatment Plant**<br>污水处理厂厌氧污泥消化的温室气体排放量<br>**Ezio Ranieri（Universita' degli Studi di Bari, Italy）**<br>Ezio Ranieri[1a°], Gianfranco D'Onghia[1a°°], Francesca Ranieri[2], Luigi Lopopolo[1], Sarah Gregorio[1], Ada Cristina Ranieri[3,4]<br>1 Universita' degli Studi di Bari, Italy 2 Universita' degli Studi di Foggia 3 Politecnico di Bari, Dipartimento Interateneo di Fisica, Italy 4 Universita' Internazionale Telematica Uninettuno, Italy |
| | 8:50-9:15 | **Innovative Technologies for Carbon Reduction and Sequestration in Sludge Treatment: A Path to Environmental Sustainability**<br>污泥处理中的碳减排和碳封存创新技术：环境可持续性之路<br>**Heinz Peter Mang (University of Science and Technology Beijing, China)**<br>Heinz Peter Mang [1&2], Zifu Li [1], Zubin Shrestha [2], Elisabeth M. Huba [3]<br>1. University of Science and Technology Beijing, China 2. UPM Umwelt-Projekt-Management GmbH, Germany 3. GERBIO German Biogas and Bioenergy Society, Germany |
| | 9:15-9:40 | **The carbon footprint of producing biogas and biomethane from municipal sludge digestion**<br>城市污泥厌氧消化生物天然气及生物甲烷的碳足迹<br>**William P. F. Barber (Cambi, USA)** |
| | 9:40-9:55 | **Discussion** 讨论 |
| Coffee Break | 9:55-10:05 | |
| 10:05-12:00 Parallel Sessions | 10:05-10:30 | **Integrated fixed-film activated sludge system – MBR: the influence of loading rate**<br>MBR和IFAS-MBR一体化固定生物膜活性污泥系统:负荷率的影响<br>**Giorgio Mannina (University of Palermo, Italy)**<br>Paulo M. Bosco Mofatto [1], Alida Cosenza [1], Daniele Di Trapani [1], Giorgio Mannina [1*]<br>1. University of Palermo, Palermo, Italy |
| | 10:30-10:55 | **Detection of Filamentous Bacteria in Activated Sludge: A Deep Learning-based Quantitative Image Analysis Approach Using U-Net Semantic Segmentation Method**<br>活性污泥中丝状细菌的检测：使用 U-Net 语义分割方法的基于深度学习的定量图像分析方法<br>**Uthpala Kaushalya (Hokkaido University, Japan)**<br>Uthpala Kaushalya [1], Yuki Nakaya [1*], Shota Ishizaki [1], Kai Sugino [1], Reiko Hirano [2], Hisashi Satoh [1]<br>1. Hokkaido University, Japan 2. Cellspect Co., Ltd., Japan |
| | 10:55-11:20 | **Minimizing Sludge Generation in Hybrid-biofilm and Membrane Bioreactors: from MIDEPURO to S4WAT Project**<br>混合生物膜和膜生物反应器污泥减量化：从MIDEPURO 到S4WAT 项目<br>**Francesco Di Capua (University of Basilicata, Italy)**<br>Francesco Di Capua [1,*], Raffaele Morello [2], Cigdem Kalkan Aktan [3], Erkan Sahinkaya [4]<br>1.University of Basilicata, Italy 2.University of Bari Aldo Moro, Italy 3.Marmara University, Turkey 4.Istanbul Medeniyet University, Turkey |
| | 11:20-11:45 | **Production of Medium Chain Fatty Acids by Microbial Electrosynthesis from Waste Activated Sludge**<br>微生物电化学合成法从活性污泥中生产中链脂肪酸<br>**He Liu (Jiangnan University, China)** |
| | 11:45-12:00 | **Discussion** 讨论 |
| Buffet Lunch | 12:00-13:30 | |

# Conference Programme

**ROOM XXXX 2024.05.19**

**SESSION 6 Innovative practice and management of green & low-carbon sludge treatment**

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| 14:00-16:05<br>Parallel Sessions | 14:00-14:25 | **Enlarge the Land Use of Sewage Sludge and its Product - Our Four Years Exploration in Beijing of China**<br>扩大污水污泥及其产品的土地利用—我们在中国北京的四年探索<br>**Fenfen Zhu (Renmin University of China, China)**<br>Fenfen Zhu [1], Bing Zhao [1], Qian Chen [1], Yuhui Zhang [1], Jiawei Wang [2], Xingmin Fu [2], Huan Wang [1]<br>1.Renmin University of China, Beijing, China 2.Beijing Drainage Group, Beijing, China |
| | 14:25-14:50 | **Sludge treatment to enhance recycling and resource recovery in a circular economy Malaysia**<br>马来西亚污泥处理促进再生利用与资源回收的循环经济<br>**Datin Ts. Suhaily Saleh (Ministry of Energy Transition and Public Utilities, Malaysia)** |
| | 14:50-15:15 | **Biosolids Management and Regulatory Changes in North America: What is next?**<br>北美生物固体管理和监管变化：下一步是什么？<br>**Yasemin Beckers (University of Waterloo, Canada)** |
| | 15:15-15:40 | **Development of a Standard Procedure for the Assessment of Sludge/Biosolids and Organic Products Stability**<br>评估污泥/生物固体和有机产品稳定性的标准程序<br>**Ludovico Spinosa (UNI/GL5 Coordinator, Env. Cons. at ETS S.r.l., Bari, Italy)**<br>Ludovico Spinosa [1], Livia Molinari [2], Andrea N. Rossi [3]<br>1. UNI/GL5 Coordinator, Env. Cons. at ETS S.r.l., Bari, Italy 2. UNI/GL5 Expert, Valli S.p.A, Lonato del Garda (BS), Italy 3. UNI/GL5 Expert, Progress S.r.l., Milano, Italy |
| | 15:40-15:55 | **Discussion** 讨论 |
| Coffee Break | 15:55-16:05 | |
| 16:05-18:00<br>Parallel Sessions | 16:05-16:30 | **Hyperthermophilic Composting(HTC) and recycling of municipal sludge**<br>超高温堆肥(HTC)处理城市污泥及循环利用<br>**Tong Zhu (Northeastern University, China)**<br>Tong Zhu [1], Youzhao Wang [1], Feng Ma [1], Chaoyue Zhao [1], Xu Li [1], Yanping Zhang [1], Zhipeng Wang [1], Xiaoyan Dang [1], Shumin He [1]<br>1. Northeastern University, Shenyang, China |
| | 16:30-16:55 | **Challenges and Prospects of Faecal Sludge Management in Cameroonian Cities: A Case Study of Yaoundé**<br>喀麦隆城市粪便污泥管理的挑战与前景：雅温得案例研究<br>**Jean-Roland MOUNKAPEGNA (Wastewater Research Unit, Yaoundé, Center Region, Cameroun)**<br>Jean-Roland MOUNKAPEGNA[1], Raymond SEZAWO[2], Stanislas MVONDO[3]<br>1. Wastewater Research Unit, Yaoundé, Center Region, Cameroun 2. Faecal Sludge Treatment Plant, Yaoundé Etoa, Center Region, Cameroon 3. Yaoundé City Council, Yaoundé, Center Region, Cameroon |
| | 16:55-17:20 | **Effects of Poor Solid Waste Management on Faecal Sludge Emptying, Treatment and Disposal Services in Lusaka**<br>固体废物管理不善对卢萨卡粪便污泥倾倒、处理和处置服务的影响<br>**Mwila A Kapembwa (BORDA and University of Zambia, Zambia)**<br>Aubrey Simwambi[1], Mwila A Kapembwa[2], Kapanda Kapanda[3]<br>1.BORDA and University of Zambia, Zambia 2.BORDA, Lusaka, Lusaka, Zambia 3.Lusaka Sanitation Project and University of Zambia, Zambia |
| | 17:20-17:45 | **Deep Row Entrenchment of Faecal Sludge in Areas with No Treatment Facilities**<br>在没有处理设施的地区深层掩埋粪便污泥<br>**Lynette Owomuhangi (Water For People, Kampala, Uganda)**<br>Lynette Owomuhangi[1], Martin Nyanzi Mawejje[2] |
| | 17:45-18:00 | **Discussion** 讨论 |
| Dinner | 18:30-20:00 | |

# Conference Programme

**ROOM XXXX 2024.05.19**

**SESSION 3. Sludge treatment to enhance recycling and resource recovery in a circular economy (Energy Recovery)**

| | | |
|---|---|---|
| 8:00-10:05<br>Parallel Sessions | 8:00-8:25 | **A novel approach for the fractionation in ADM1 and model modification and validation based on the methanogenic potential**<br>在ADM1中进行分馏的新方法以及基于产甲烷潜能值的模型修改和验证<br>**Wenjie Guo（Tongji University, China）**<br>Wenjie Guo [1], Dunjie Li [1], Zhipeng Zhang [1], Rongrong Mo [1], Yongmei Li [1,2,*]<br>1.Tongji University, China 2.Shanghai Institute of Pollution Control and Ecological Security, China |
| | 8:25-8:50 | **Insights of microbial community shifts in mono- and co-digestion of sewage sludge and food waste**<br>污水污泥和厨余单一消化和协同消化过程中微生物群落变化的启示<br>**Lijun Luo (Hong Kong Baptist University, Hong Kong SAR, China)**<br>Lijun Luo*, Nirakar Pradhan*<br>*Hong Kong Baptist University, Hong Kong SAR, China. |
| | 8:50-9:15 | **Phosphorus release and transformation in anaerobic digestion of thermal hydrolysis pretreatment sludge – masking effects from high ammonium**<br>热水解预处理污泥厌氧消化过程中磷的释放和转化--高氨的掩蔽效应<br>**Yun Chen (Nanyang Technological University, Singapore)**<br>Yun Chen [1, 2], Yan Zhou [1*]<br>1. Nanyang Technological University, Singapore 2. Nanjing Normal University, China |
| | 9:15-9:40 | **Centralized anaerobic digestion of municipal sewage sludge: technology advances and sustainable strategies for circular economy**<br>城市污水污泥集中厌氧消化：循环经济的技术进步和可持续战略<br>**Francesco Di Capua (University of Basilicata, Potenza, Italy)**<br>Francesco Di Capua [1], Andrea Giordano [2]<br>1.University of Basilicata, Italy 2. Acqua & Sole s.r.l., Vellezzo Bellini, Italy |
| | 9:40-9:55 | **Discussion** 讨论 |
| Coffee Break | 9:55-10:05 | |
| 10:05-12:00<br>Parallel Sessions | 10:05-10:30 | **Effects of Methane Yields on SBR sludge using Thermal Hydrolysis Pretreatment**<br>热水解预处理对SBR污泥甲烷产量的影响<br>**Ashish K Sahu (Cambi Group AS, Norway)**<br>Gowtham Balasundaram[1], Pallavi Gahlot[1], Vinay Kumar Tyagi[2], Absar A Kazmi[1], Harald Kleiven[3], Ashish K Sahu[3]<br>1.Indian Institute of Technology, India 2.National Institute of Hydrology, India 3.Cambi Group AS, Asker, Norway |
| | 10:30-10:55 | **Advanced Anaerobic Digestion at Tarnow, Poland achieves Effective Biosolids Management, Asset Optimisation and Circular Economy**<br>在波兰塔尔诺进行的高级厌氧消化实现有效的生物固体管理、资产优化和循环经济<br>**Ashish K Sahu (Cambi Group AS, Viken and Norway)**<br>Jakub Mukawa[1], Jacek Kosciukiewicz[2], Agnieszka Niedzielska[2], Ashish K Sahu[2]<br>1. Tarnowskie Wodociągi Sp. z o. o., Tarnow, Poland 2. Cambi Group AS, Asker, Viken and Norway |
| | 10:55-11:20 | **Anaerobic digestion as a potential approach for the conversion of aqueous pyrolytic liquor into biogas**<br>厌氧消化作为将水相热解液转化为沼气的潜在途径<br>**Rui Zhang (Kyoto University, Japan)**<br>Rui Zhang[1], Kazuyuki Oshita [1*], Masaki Takaoka[1]<br>1. Kyoto University, Japan |
| | 11:20-11:45 | **Performance and metagenomics analysis of CaO promoting methane production from sludge anaerobic fermentation**<br>通过CaO促进污泥厌氧发酵产甲烷的性能和宏基因组分析<br>**Hang Li (Hebei university, China)**<br>Hang Li [1, 3], Hongjie Wang [1, 2, 3], Qiushuo Zhang [1, 3], ZiXue Liu [1, 3], Yutong Wu [1, 3], Yali Wang [1, 2, 3, *]<br>1.Hebei Key Laboratory of close-to-Nature restoration technology of wetlands, School of Eco-Environment, Hebei university, China 2.School of life science, Hebei university, China 3.Institute of Xiong'an New Area, Hebei university, China |
| | 11:45-12:00 | **Discussion** 讨论 |
| Buffet Lunch | 12:00-13:30 | |

# Conference Programme

**ROOM XXXX 2024.05.19**

**SESSION 3. Sludge treatment to enhance recycling and resource recovery in a circular economy (Energy Recovery)**

| | | |
|---|---|---|
| 14:00-16:05<br>Parallel Sessions | 14:00-14:25 | **Assembly of Low-dose Nonionic Surfactant Hydrophobic Functional Groups with Extracellular Polymeric Substances: Enhancing Surface Free Energy of Sludge Particles and the Response of Methanogenic Bacterial Enzyme Activity to Improve Biomass Energy Recovery Efficiency**<br>组装低剂量非离子型界面活性剂疏水性官能团与胞外聚合物:提高污泥颗粒的表面自由能, 改善甲烷生成菌酶活性, 提高生物质能量回收效率<br>**Yu Hua (Tongji University, China)**<br>Qi Song, Yu Hua*, Xiaoguang Liu, Shuxian Chen, Xiaohu Dai*<br>Tongji University, China |
| | 14:25-14:50 | **Challenging the Retention Time of Municipal Anaerobic Digestion by Using Thermal Hydrolysis Pretreatment**<br>热水解预处理缩短城市污泥厌氧消化的保留时间<br>**William P. F. Barber (Cambi, Inc., USA)**<br>William P. F. Barber [1*], Matthew Higgins [2]<br>1.Cambi, Inc., USA 2. Bucknell University, USA |
| | 14:50-15:15 | **Study on the mechanism of hydrogen production and recovery of vivianite in iron-carbon double anode electrofermentation system by intermittent power supply**<br>间歇供电条件下电化学发酵双阳极铁碳系统中产氢机制及磷灰石资源化研究<br>**Zhengtong Guo (Taiyuan University of Technology, China)**<br>Zhengtong Guo[1], Zhihong Liu [1*], Aijuan Zhou1, Xiuping Yue [1,*]<br>1. Taiyuan University of Technology, China |
| | 15:15-15:40 | **Lactic acid-based hydrogen production from food waste: A study on metabolic and taxonomic profile**<br>以乳酸为基础从食物垃圾中制氢：新陈代谢和分类研究<br>**Lijun Luo (Hong Kong Baptist University, Hong Kong SAR, China)**<br>Lijun Luo [1*], Nirakar Pradhan<br>1. Hong Kong Baptist University, Hong Kong SAR, China |
| | 15:40-15:55 | **Discussion** 讨论 |
| Coffee Break | 15:55-16:05 | |
| 16:05-18:00<br>Parallel Sessions | 16:05-16:30 | **$Fe_3O_4$@MOF-808 for Enhanced Carbon and Phosphorus Recovery from Sludge Anaerobic Fermentation**<br>$Fe_3O_4$@MOF-808 用于提高污泥厌氧发酵的碳和磷回收率<br>**Hongtao Zhu (Beijing Forestry University, China)**<br>Long Chen, Xiangyue Zhang, Jianming Zhu, Helin Fan, Zimu Qin, Jun Li, Hongtao Zhu*<br>Beijing Forestry University, China |
| | 16:30-16:55 | **Tailored value-added carboxylic acids conversion from waste activated sludge fermentation triggered by sulfate reduction-mediated syntrophic consortia**<br>由硫酸盐还原介导的合成营养群引发的废物活性污泥发酵中羧酸的定制增值转化<br>**Aijuan Zhou (Taiyuan University of Technology, China)**<br>Aijuan Zhou [1,2,*], Yaxin Fan [1], Hongyan Liu [1], Xiuping Yue [1,3]<br>1. Taiyuan University of Technology, China 2. Shanxi Shanan Lide Environmental Science & Technology Co., LTD, China<br>3. Shanxi-Zheda Institute of Advanced Materials and Chemical Engineering, China |
| | 16:55-17:20 | **Sludge electrooxidation as a pretreatment for anaerobic digestion: synergistic effect of combined treatment on microbial inactivation**<br>污泥电氧化作为厌氧消化的预处理：联合处理对微生物灭活的协同效应<br>**Jose A. Barrios (Instituto de Ingeniería UNAM, México)**<br>Jose A. Barrios*, Catalina Maya, Mónica Pérez, Angélica Román & Blanca Jiménez<br>Instituto de Ingeniería UNAM, México |
| | 17:20-17:45 | **Effects of salinity on anaerobic digestion of municipal sludge: focusing on biogas production and microbial community**<br>盐度对市政污泥厌氧消化的影响：聚焦于沼气产量和微生物群落<br>**Xiaokang Feng (Qingdao University of Technology, China)**<br>Xiaokang Feng[1], Yuemei Yan[1], Wei Zhang[2], Lu Jing[1], Zhixuan Yin [1,*], Changqing Liu[1]<br>1.Qingdao University of Technology, China 2.Tuandao Wastewater Treatment Plant, China |
| | 17:45-18:10 | **Start-Up of thermophilic anaerobic digestion of THP sludge driven by iron-containing sludge-based biochar**<br>含铁污泥生物炭驱动的THP污泥嗜热厌氧消化的启动<br>**Yan Zhou (Nanyang Technological University, Singapore)**<br>Hui Xu[1], Zong Li[2], Yan Zhou[2,*]<br>1 Nanyang Environment and Water Research Institute 2 School of Civil and Environmental Engineering, Nanyang Technological University, Singapore |
| | 18:10-18:25 | **Discussion** 讨论 |
| Dinner | 18:30-20:00 | |

# Conference Programme

**ROOM XXXX 2024.05.19**

**4. Innovative approaches to reduce carbon footprint and greenhouse gas emissions (Sludge Conditioning & Dewatering)**

| | | |
|---|---|---|
| 8:00-10:05<br>Parallel Sessions | 8:00-8:25 | **Fluorescence Spectral Fingerprints: A New Approach to Characterizing the Intermolecular Interactions of Extracellular Polymeric Substances (EPS) in Activated Sludge**<br>荧光光谱指纹：表征活性污泥中细胞外聚合物物质（EPS）分子间相互作用的新方法<br>**Jinlan Yu（University of Chinese Academy of Sciences, China）**<br>Jinlan Yu [1,2], Kang Xiao [1,*], Yirong Xu[1], Aiqian Zhang[1], Xianghua Wen[2]<br>1.University of Chinese Academy of Sciences, China 2.Tsinghua University, China |
| | 8:25-8:50 | **Crystallization-driven Evolution of Water Occurrence States with Implications on Dewaterability Improvement of Waste-activated Sludge**<br>结晶驱动的水形态演变对改善废活性污泥脱水性能的影响<br>**Boran Wu (Tongji University, China)** |
| | 8:50-9:15 | **Biochar Skeleton Assisted Sludge Conditioning and Dewatering**<br>生物炭骨架辅助污泥调理和脱水<br>**Zheng Ge (Beijing University of Technology, China)**<br>Zheng Ge*, Yixin Zhang, Jia Deng, Yixin Yu<br>University of Technology, China |
| | 9:15-9:40 | **Effect of Inorganic Coagulant Addition in Sewage Sludge Dewatering with Organic Polymer Flocculants**<br>有机高分子絮凝剂在污水污泥脱水过程中添加无机混凝剂的影响<br>**Kazuyuki Oshita (Kyoto University, Japan )**<br>Kazuyuki Oshita [1*], Takuto Miura [2] and Masaki Takaoka [1]<br>1. Kyoto University, Japan 2. Pacific Consultants Co., LTD, Tokyo, Japan |
| | 9:40-9:55 | **Discussion** 讨论 |
| Coffee Break | 9:55-10:05 | |
| 10:05-12:00<br>Parallel Sessions | 10:05-10:30 | **The Application of Chitosan Hydroxypropyltrimethyl Ammonium Chloride to Substitute Polymeric Aluminum Ferric Chloride for Sewage Sludge Deep Dewatering**<br>应用壳聚糖羟丙基三甲基氯化铵替代聚合氯化铝铁进行污水污泥深度脱水<br>**Minmin Liu (Research Centre for Eco-Environmental Sciences, Chinese Academy of Sciences, China)**<br>Minmin Liu [1], Sajid Rashid [1], Wei Wang [2], Huihui Zhang [2], Yawei Zhao [2], Xingmin Fu [2], Wenzheng Yu [1*]<br>1.Research Centre for Eco-Environmental Sciences, Chinese Academy of Sciences, China 2. Beijing Drainage Group Co., Ltd., China |
| | 10:30-10:55 | **Exploring the Influencing Factors of Sludge Dewaterability from the Perspective of Interfacial Energy**<br>从界面能角度探讨污泥脱水性能的影响因素<br>**Kang Xiao (University of Chinese Academy of Sciences, China)**<br>Yirong Xu[1], Kang Xiao [1*], Jinlan Yu[1], Guoren Xu[1]<br>1. University of Chinese Academy of Sciences, China |
| | 10:55-11:20 | **Characterization of Moisture Boundness in Faecal Sludge from Onsite Sanitation Facilities**<br>现场卫生设施粪便污泥中水分结合力的表征<br>**Santiago Septien (University of KwaZulu-Natal, South Africa)**<br>Santiago Septien [1], Arun K. Rayavellore Suryakumar[1], Larona Malope[1], Ratidzaishe T. Mupinga[1], Yashlen Pather1, Edwina Mercer[1], Tanaka M. Chatema[1], Janna Darmovzalova[1] , Jonathan Pocock[2], Anusha Singh<br>1. WASH R&D Centre, University of KwaZulu-Natal, Durban, South Africa<br>2. Chemical Engineering, University of KwaZulu-Natal, Durban, South Africa |
| | 11:20-11:45 | **Sustainable Management of Sewage Sludge Through a Multi-Effect Integrated Technology**<br>通过多效应集成技术实现污水污泥的可持续管理<br>**Huan Liu (Newway Technologies Ltd. , Canada)** |
| | 11:45-12:00 | **Discussion** 讨论 |
| Buffet Lunch | 12:00-13:30 | |

# Conference Programme

**ROOM XXXX 2024.05.19**

**4. Innovative approaches to reduce carbon footprint and greenhouse gas emissions (Sludge Drying & Thermal Treatment)**

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|---|---|---|
| 14:00-16:05 Parallel Sessions | 14:00-14:25 | **Testing of Two Novel Solar Thermal Drying Systems for Sludge Treatment**<br>测试用于污泥处理的两种新型太阳能热干燥系统<br>**Santiago Septien (University of KwaZulu-Natal, South Africa)**<br>Santiago Septien [1,*], Pareshin Naidoo [1], Akhil Ramlucken [1], Trishandra Nadesan [1], Kaverajen Pillay [1], Karlin Naidoo [1], Yashlen Pather [1], Craig Mcgregor [2], Jonathan Pocock [3], Freddie L. Inambao [4], Anusha Singh [3]<br>1. WASH R&D Centre, University of KwaZulu-Natal, South Africa 2. Solar Thermal Energy Research Group, University of Stellenbosch, South Africa 3. Chemical Engineering, University of KwaZulu-Natal, South Africa<br>4. Mechanical Engineering, University of KwaZulu-Natal, South Africa |
| | 14:25-14:50 | **Study on Drying Process of Drinking Water Treatment Plant (DWTP) Sludge**<br>饮用水处理厂（DWTP）污泥干燥工艺研究<br>**Xiaomeng Han (Donghua University, China)**<br>Xiaomeng Han*, Shihu Shu<br>College of Environmental Science and Engineering, Donghua University, Shanghai, China |
| | 14:50-15:15 | **Assessment of an Anaerobic Sludge Drying and Thermal Sanitization System for Small and Medium STPs at Pilot Scale**<br>中小型污水处理厂厌氧污泥干化和热消毒系统的中试评估<br>**Adalberto Noyola (National Autonomous University of Mexico, Mexico)**<br>Julio C. Rietow[1*], Marcos C. Barros Filho[1], Gustavo R. C. Possetti[2], Adalberto Noyola[3], Luiz Wagner[2], Miguel M. Aisse[1].<br>1. Federal University of Parana (UFPR), Brazil 2. Parana Sanitation Company (SANEPAR), Brazil 3. National Autonomous University of Mexico (UNAM), Mexico |
| | 15:15-15:40 | **Non-sintered Ceramsite Prepared by Using Water Supply Plant Sludge Combined with Reclaimed Diatomite and Application in Phosphorus Removal**<br>利用自来水厂污泥和再生硅藻土制备的非烧结铈镧石及其在除磷中的应用<br>**Fang Feng (Suzhou University of Science and Technology, China)**<br>Fang Feng*, Ziqian Shi, Fei Wang, Dongtian Wang<br>Suzhou University of Science and Technology, China |
| | 15:40-15:55 | **Discussion** 讨论 |
| Coffee Break | 15:55-16:05 | |
| 16:05-18:00 Parallel Sessions | 16:05-16:30 | **Investigation of Inherent Minerals Effects on Sewage Sludge Smoldering Combustion**<br>固有矿物质对污水污泥阴燃的影响<br>**Qianshi Song (Guangzhou Institute of Energy Conversion, Chinese Academy of Sciences, China)**<br>Wei Zhang [1,2], Qianshi Song [1,*], Xiaohan Wang [1,2,*], Xiaowei Wang [3], Boyi Qian [1,2], Kangwei Xu [1,2]<br>1. Guangzhou Institute of Energy Conversion, Chinese Academy of Sciences, China 2. University of Science and Technology of China, China 3. Guangdong Ocean University, Zhanjiang, China |
| | 16:30-16:55 | **Combining Advanced Anaerobic Digestion with Incineration to achieve Sustainable Sludge Management**<br>结合高级厌氧消化与焚烧以实现可持续的污泥管理<br>**Julien Chauzy (Cambi Group AS, Norway)**<br>Julien Chauzy [1 *], Zuliang Liao [1], Di Deng [2], Maggie Zhang [2]<br>1. Cambi Group AS, Asker, Norway 2. Cambi Environment Technology Ltd, Beijing, China |
| | 16:55-17:25 | **Sludge Co-incineration Technology in Coal-fired Power Plants and Standards Development**<br>发电与污泥协同技术现状及标准规范进展<br>**Ranfang Zuo（CHN Energy Investment Group, China)** |
| | 17:25-17:40 | **Discussion** 讨论 |
| Dinner | 18:30-20:00 | |

# Technical Tour

## Technical Tour Information

◇ **Technical Tour Time：8:00 ~ 12:00, 20th May, 2024**

◇ **Technical Tour Site**: **Huaifang Underground Water Reclamation Plant, Beijing (HUWRP)**

- ＊ **Wastewater Treatment capacity**: **600,000 $m^3$/d** (The largest fully underground wastewater treatment plant in Asia)
- ＊ **Sludge Treatment Capacity**: **1220 t/d** (Approx. 85% water content)
- ＊ **Wastewater Treatment Process**: Wastewater → Pre-treatment → MBR → Ozone Oxidation → UV Disinfection → Landscape Wetlands
- ＊ **Sludge Treatment Process**: Sludge → Thermal Hydrolysis → Anaerobic Digestion → Plate-and-frame Dewatering → Gardening Utilization

  Dewatering Filtrate → Anaerobic Ammonium Oxidation
- ＊ **Award**: 2018 IWA Project Innovation Award - Gold Award

◇ **Technical Tour Schedule:**

| Time | Location | Content |
|---|---|---|
| Before 8:00 | Hall of Beijing China-Germany International Conference Convention & Exhibition Center | Gather for the shuttle bus |
| 8:00 - 9:30 | Shuttle bus | Way to HUWRP |
| 9:30 - 10:30 | Huaifang Underground Water Reclamation Plant | Technical Tour |
| 10:30 - 12:00 | Shuttle bus | Back to the hotel |
| 12:00 - 14:00 | Dinner Hall | Lunch |
| 14:00 | Conference closed | Conference closed |

Aerial view of the wastewater treatment plant

Processed water distribution pumps

2nd floor of the underground plant

Suction pumps for the membrane tank

Ozone generators

Underground wastewater treatment facilities and equipment

◇ **Please scan the QR code or open the url: *https://forms.office.com/r/Vi2rVhCuX0* to fill your information if you want to attend the technical tour, and it'll help us arrange the shuttle bus for you.**