

Editorial: Design, operation and economics of large wastewater treatment plants

The Conferences on the Design, Operation and Economics of Large Wastewater Treatment Plants (LWWTP) are the most traditional specialized conferences organized by IWA specialist groups. The first conference (at that time called 'workshop') was held in Vienna in 1971 and then consecutively every four years in Vienna, until 1987 when the conference began to be held in Budapest (1987, 1999, 2011) and Prague (1991, 2003, 2015) as well. The LWWTP Conference has always been a good place for meeting with leading experts in the field from Europe, USA and Canada, Australia, South Africa, Latin America, South-East Asia and from many other parts of the world. The 2020 conference was planned to be held in Vienna, to celebrate the 50 year anniversary of this great event.



LWWTP Conference, Vienna 2007 – current members of LWWTP Specialist Group management (from left: Karl Svardal, Helmut Kroiss, Harro Bode, Willi von der Emde, Jiri Wanner, Kees de Korte, Norbert Matsché, Norbert Jardin).

However, due to the start of the Corona pandemic in early 2020, the conference was initially postponed to the first half of 2021 and later completely cancelled. With all of the travel restrictions, the organizing committee felt that it would not be possible to run the LWWTP2021 conference as a truly international event, bringing together experts from all around the world. By the time the decision was made to cancel the conference, most presenters had already submitted extended abstracts for their presentations and posters, so it was proposed to use these papers to prepare a *Water Science and Technology* special issue.

This special issue contains some of the best papers that were intended as oral presentations for the LWWTP2020, as well as some additional papers that were submitted especially for the special issue. The fully peer reviewed papers are mainly based on operational data and research centred around large-scale applications of innovative technologies and approaches. The published papers also reflect the most recent topics connected with the design and operation of LWWTPs, as data acquisition for design purposes, application of mathematical models (especially computational fluid dynamics models), nitrogen removal optimization and financial sustainability. Emerging topics of interest are also examined, such as the removal of micropollutants and microplastics, greenhouse gas emissions, activated sludge granulation and the effect of street thawing salt on plants. In addition, to adequately celebrate the 50-year anniversary of the specialist group and its conference, two papers focus on the historical development of wastewater treatment processes in this period, with a special focus on the conference series. From those review articles, it becomes clear that one of the strengths of the specialist group and the conference is the strong connection between practitioners and researchers from around the globe, who are focused on the economical design and operation of large wastewater treatment plants.

The *Water Science and Technology* special issue cannot replace traditional LWWTP conferences, but the team of editors belonging to the IWA LWWTP Specialist Group wants to emphasize the growing interest in the design and operation of large wastewater treatment plants throughout the past decades through this special issue. The outstanding role of LWWTPs nowadays results from the shift of the world's population from rural to urbanized areas with centralized sewer systems. According to the 2018 *Revision of World Urbanization Prospects* produced by the *Population Division of the UN Department of Economic and Social Affairs*, the urban population of the world has grown rapidly from 751 million in 1950 to 4.2 billion in 2018. Asia, despite its relatively lower level of urbanization, is home to 54% of the world's urban population, followed by Europe and Africa with 13% each. Today, 55% of the world's population lives in urban areas, a proportion that is expected to increase to 68% by 2050. Projections show that urbanization, the gradual shift in residence of the human population from rural to urban areas, combined with the overall growth of the world's population could add another 2.5 billion people to urban areas by 2050, with close to 90% of this increase taking place in Asia and Africa. This development also explains the increasing interest in the LWWTP topics even outside traditional areas like Europe and North America.

With the anticipation of ongoing urbanisation in the coming decades there will be an ongoing demand for the international exchange between practitioners and researchers in the field of large wastewater treatment plants. The IWA specialist group on Design, Operation and Costs of Large Wastewater Treatment Plants wants to positively influence the development by providing a network and suitable platforms for this exchange. In this sense, the next IWA conference on the Design, Operation and Economics of Large Wastewater Treatment Plants (LWWTP) is now planned for 2024 in Budapest and we look forward to meeting each other in person again.

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