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Editorial: Ecotechnologies for Wastewater Treatment – Impacting the environment with innovation in wastewater treatment

Acknowledging that resource efficiency as well as ecosystem protection are crucial goals to tackle has led to a deep rethinking in the way wastewater has been dealt with up to the 20th century. Indeed, pollution reduction to harmless levels has been the main focus of conventional wastewater treatment plants which have deployed effective and reliable solutions to get rid of suspended and dissolved pollutants. Nowadays, those same wastewaters are looked at as a mine of valuable resources that are to be harvested from the sewage through efficient technologies operated within water and resource recovery facilities (formerly known as wastewater treatment plants).

Indeed, it has been recognized that urban wastewater contains significative amounts of key resources. Nitrogen, phosphorus and potassium, essential nutrients in agriculture, though diluted, are abundant in wastewaters. To name the most relevant ones, the amount of the P load in human excreta accounts for more than 20% of its worldwide demand. Similarly, more chemical energy is available in the wastewater than the energy demand for its processing, while reclaimed water can play a significant role in facing water scarcity from climate change. In addition to this, new classes of pollutants have emerged that require the development of prevention strategies as well as adequate treatment technologies. For these reasons, rethinking the way we deal with wastewater has become the new challenge and a key tool to implement the Circular Economy Action Plan, to address numerous UN Sustainable Development Goals, as well as to provide support tools to improve resilience to environmental and global threats, including climate change, water and food security, epidemic outbreaks and political instability.

To tackle these challenging goals, new technologies as well as multidisciplinary tools are needed to pave the way toward a new water-economy, including: innovative technologies, integrated and risk-based approaches, and adequate regulatory and economic guidelines to promote technological uptake and societal acceptance.

Within this framework, this special issue collects scientists' experiences shared during the 5th International Conference on Ecotechnologies for Wastewater Treatment that was held in Milan, Italy in June 2021. Enabling technologies for resource recovery and energy efficiency are discussed as well as tools for the integrated techno-economic and environmental assessment for an holistic approach to wastewater treatment innovation.

Guest Editors

Manuela Antonelli
Politecnico di Milano, Department of Civil and Environmental Engineering, Piazza L. da Vinci 32, 20133, Milano, Italy
Andrea Turolla
Politecnico di Milano, Department of Civil and Environmental Engineering, Piazza L. da Vinci 32, 20133, Milano, Italy
Elena Ficara
Politecnico di Milano, Department of Civil and Environmental Engineering, Piazza L. da Vinci 32, 20133, Milano, Italy
Juan Lema
CRETUS, Department of Chemical Engineering, Universidade de Santiago de Compostela, 15782 Santiago de Compostela, Spain
Roberto Canziani
Politecnico di Milano, Department of Civil and Environmental Engineering, Piazza L. da Vinci 32, 20133, Milano, Italy
Francesca Malpei
Politecnico di Milano, Department of Civil and Environmental Engineering, Piazza L. da Vinci 32, 20133, Milano, Italy