WG1 Energy Efficient Technologies

06, 2016

What’s Inside

ACTIVITIES & EVENTS

About WG1

Objectives
To assess the state of the art, maturity and energy requirement of innovative efficient technologies for wastewater treatment.

Energetic self-sufficiency
Options for minimising energy consumption and optimising energy production are investigated, aiming at converting WWTPs in net energy providers. This includes activities on energy efficient processes, such as low-temperature autotrophic nitrogen removal, anaerobic – aerobic hybrid MBRs, membrane aerated biofilm reactors, supercritical water oxidation, etc.; as well as on energy recovery alternatives, like sewage sludge (co-)incineration or anaerobic (co-)digestion, microalgae photobioreactors integrated with anaerobic (co)digestion and bioelectrochemical systems (microbial fuel cells, hydrogen, etc.).

Chair
Gerasimos Lyberatos
National Technical University of Athens (Greece)

Co-chair
M.Concetta Tomei
Water Research Institute, CNR, Rome (Italy)

Secretary
Francesco Fatone
University of Verona (Italy)

WG1 ORGANIZATION – TASK GROUPS

TG1 Energy Efficient Nutrient Removal
TG2 Membrane Bioreactors
TG3 (joined with WG3) Micropollutants and Recalcitrant
TG4 Efficient Sludge Technologies
TG5 Anaerobic Treatment of Wastewater
TG6 Aerobic Granular Reactors
TG1 — Energy efficient nutrient removal

List of Publications


Projects


• Integrated technology for improved energy balance and reduced greenhouse gas emissions at municipal wastewater treatment plants “BARITECH” - This project is founded from Norway Grants in the Polish-Norwegian Research Programme operated by the National Centre for Research and Development.

• Production of sustainable energy from wastewater by microbial electrolysis cells. VALTEC13-1-0140. Generalitat de Catalunya. GENOCOV (UAB ). 01/01/2014 - 31/12/2015. PI: Albert Guisasola Canudas.

• Development of an energetically self-sufficient urban wastewater treatment plant through autotrophic nitrogen removal in the mainstream and phosphorus recovery. CTQ2014-60495-R. MINECO. UAB. 01/01/2015 - 31/12/2017. PI: Juan Antonio Baeza and Julián Carrera.


• LIFE14 ENV/ES/000633 – LIFE SAVING-E “Two-Stage Autotrophic N-removal for mainstream sewerGe trEatment”. The challenge of SAVING-E is to radically redesign the urban WWTPs in a way they become energy-producers rather than energy consumers, without affecting its performance or even improving it. More information www.saving-e.eu. Follow us on Twitter: @Life_SAVING_E

• RETOS 2015 - CTQ2015-69802-C2-1-R–SONOVA “SONOVA: Development of a comprehensive treatment process for SOx and NOx from flue gas addressed to waste gases valorization”.

• CYTED network 316RT0508 - TRITÓN “Treatment and Recycling of Industrial Waters Through Sustainable Solutions Based in Biological Processes” (Tratamiento y Reciclaje de Aguas Industriales Mediante Soluciones Sostenibles Fundamentadas en Procesos Biológicos). The treatment and recycling of industrial water is a problem that is not completely solved in Latin America. This problem is worse for Small and Medium Enterprises (SMEs), which often do not have sufficient means and knowledge to address the problem. In addition, the lack of harmonized legislation hinders the transfer and annlication of
technologies between companies in different countries. TRITON network aims the treatment and recycling of wastewaters from the Latin American SMEs through sustainable solutions based in biological processes. More information http://triton-cyted.com/ (in Spanish). Follow us on Twitter: @triton_cyted.

Conferences

- Blázquez, E., Lafuente, J., Gabriel, D. Biotrickling filtration of High loads of Ammonia: a lab-scale experience. Oral Presentation. 6th International Conference on Biotechniques for Air Pollution Control, Ghent (Belgium), September 2015.
• Gutwiński, P., Cema, G., Surmacz-Górska, J. Lead (Pb) Inhibition of Anammox Biomass After Short-Term Exposure – Batch Experiments. 8th Eastern European Young Water Professionals Conference, 11–14 May 2016, Gdańsk, Poland.


• López, L.R., Dorado, A.D., Mora, M., Prades, Ll., Gamisans, X., Lafuente, J., Gabriel, D. Modelling biotrickling filters to minimize elemental sulfur accumulation during biogas desulfurization under aerobic conditions. 7th European Meeting on Chemical Industry and Environment (EMCHIE 2015), Tarragona (Spain), June 2015.

• López, L.R., Mora, M., Justo, T., Lafuente, J., Gabriel, D. Optimization of biogas desulfurization in aerobic biotrickling filters through the trickling liquid velocity regulation under variable loading rate conditions. 6th International Conference on Biotechniques for Air Pollution Control, Ghent (Belgium), September 2015.

• Mora, M., Gamisans, X., Gabriel, D. Respirometry as a tool for microbial activity monitoring in biotrickling filters. 6th International Conference on Biotechniques for Air Pollution Control, Ghent (Belgium), September 2015.

• Morral, E., Lao-Luque, C., Gabriel, D., Dorado, A.D., Gamisans, X. Elimination of hydrophobic volatile organic odorous compounds using a microporous membrane bioreactor. Oral Presentation. 6th International Conference on Biotechniques for Air Pollution Control, Ghent (Belgium), September 2015.


• Nenov, V. Struvite recovery options in conventional wastewater treatment plants. First BWA Conference on "WWTP Sludge: Problems and Solutions" 10 May 2016, Sofia, Bulgaria.

• Nenov, V., Jemendjiev, H., Peeva, G. Struvite recovery options in conventional wastewater treatment plants (WWTPs). Colloque International Fes University, 28 et 29 octobre 2015 « Eau, Recyclage et Valorisation des Déchets."


**STSM – cooperation activities**

• Research stay of Anna Węgrzyn (Silesian University of Technology, Environmental Biotechnology Department) at Department Environmental Genomics (EGEN), Helmholtz Zentrum München German Research Center for Environmental Health, responsible Prof. Peter Schröder. STMS title 'Endophytic bacterial diversity in roots of Miscanthus sp. in wetlands treating wastewater containing pharmaceuticals’, from 1st March to 30th April 2016.
TG2 — Membrane bioreactors

List of Publications


Projects


Conferences


TG2 HIGHLIGHTS

Leader

Eoin Syron
University College Dublin
(Ireland)
eoin.syron@ucd.ie

Presentation and Objectives

Given the expertise of the TG2 components, potential topics for the Task Group are:
- Anaerobic MBR
- Post treatment of anaerobic reactors
- Membrane fouling
- Energy usage
- Removal of nutrients & emerging pollutants

Potential deliverables of TG2 are:
- Recommendations on when to use an mbr
- Paper on the current state of the art in europe with respect to MBR


TG3 — Micropollutants and recalcitrant

Presentation and Objectives

The main objective of TG3 is to review the micropollutants in wastewater treatment worldwide and to communicate this issue in Europe. In fact, across Europe, most people don’t know where our drinking water comes from, or how big the efforts are to allow us to perform the most normal daily action, namely to open the tap and to consume clean, clear and pure water. Still, it is the extremely high quality of our drinking water that ensures the healthy life we lead. In fact, to provide unpolluted water as a resource for drinking water supply, food production but also other aspects of daily life, is one of the major challenges for Europe in the closer future. Whereas well-assessed treatment strategies exist for classical issues such as removal of nutrients (phosphorus and nitrogen), detergents and even microorganisms, novel emergent organic compounds pose a threat to our water reserves. More than 100,000 different chemicals are presently distributed on the European market, one third of them exceeding quantities of one ton per year. Thanks to the continuous improvement of analytical techniques, a large number of pharmaceuticals has been detected and identified frequently during the last years in effluents from wastewater treatment plant, surface waters or ground waters. Since the majority of all significant waters, lakes and streams are shared between several European countries, the EU has to find a common strategy for the treatment of wastewater, and a zero pollution regime for effluents. Furthermore it will be necessary to expand the scope of water protection to all waters, surface waters and groundwater; to achieve satisfactory status for all waters by a set deadline; and to delegate water management to regional authorities based on river basins.

List of Publications


Projects

• Degradation of pharmaceuticals in wastewater by biological processes and advanced oxidation. 2015-1016. Convénio entre Portugal (FCT) e Itália (CNR) - CNR-IRSA.


• Aplicación de los procesos de oxidación avanzada a la reutilización de agua (CTQ2011-26258. SPAIN) 2012-2015.

• Advanced Treatments for Water Sustainability in Europe and China (PIRSES-GA-2012-318926.EU) 2012-2015.


• Microbiology Project – Degree in Microbiology from ESB – UCP (March 2016 - June 2016) Enrichment of endocrine disruptors from soils and sediments – Catarina Camilo and Maria Teixeira.
Conferences


- Amorim, C.L., Henriques, I.S., Castro, P.M.L. Microbial population dynamics within aerobic granular sludge exposed to a mixture of pharmaceuticals. 6th Congress of Microbiology and Biotechnology: Microbiotec15. Évora, Portugal, 10-12 December 2015. http://hdl.handle.net/10400.14/19838


• Papa, M., Gonzalez, L., Feretti, D., Ceretti, E., Mazzoleni, G., Steinberg, N., Pedrazzani, R., Bertanza, G., Lema J., Carballa, M. Fate and removal of organic micropollutants during anaerobic digestion of sewage sludge: are chemical + biological assays a winning combination?. Proceedings of AD14 - World Congress on Anaerobic Digestion, Vina del Mar, Chile, 15-18 November 2015.


Other events
• Micropollutants in Water, Specialised Online Course (SpOC) by Joint Task Force on Micropollutants and recalcitrant compounds (WG3 headed by Peter Schroeder, and co-lead Giuseppe Mascolo from WG1).
TG4 — Efficient sludge technologies

List of Publications


Conferences


TG5 — Anaerobic treatment of wastewater

List of Publications

Conferences


Projects

TG6 — Aerobic granular reactors

List of Publications


Projects

- Projecto de Microbiologia e Qualidade Ambiental – Master in Applied Microbiology from ESB – UCP (October 2015 - December 2015) Impact of pharmaceuticals on ammonia-oxidizing bacteria within aerobic granular sludge - Ana Meireles; Angela Alves; Marta Carvalho
Conferences


Other events

Share this COST WATER_2020 WG1 News

Feedback: tomei@irs.cnr.it

Access to COST WATER_2020:
http://www.water2020.eu/

Access to WG1 and TGs:
http://www.water2020.eu/wg1-efficient-technologies

Next events
ECOSTP 2016
INTERNATIONAL IWA CONFERENCE
CAMBRIDGE, UK
27-30 JUNE 2016

Newsletter realized by M. Concetta Tomei & Domenica Mosca Angelucci